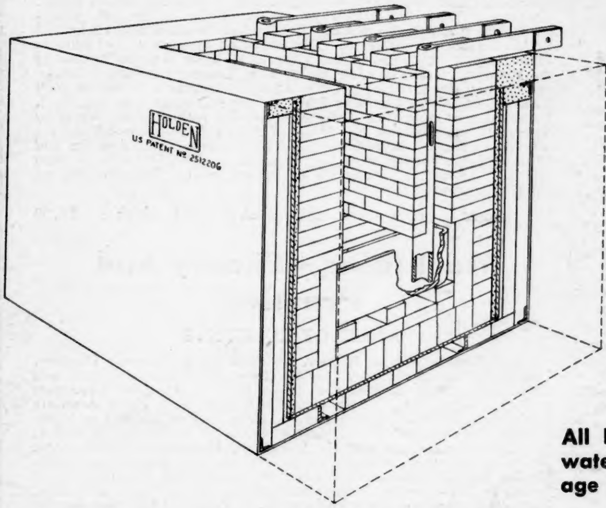
Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXIV - No. 2 February, 1951

HOLDEN ELECTRODE FURNACES



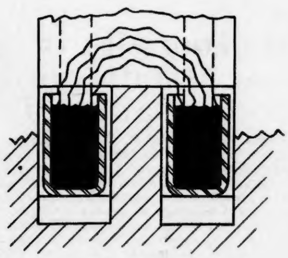
20% Lower Operating Costs

1. Removable Power Conductor Bars from Liquid Electrode Pools.
2. Complete Replacement Unit.
3. No salt saturation into insulation material.
4. Lower shell temperature.
5. Power conductor bars.
6. 5″ min. refractory between power conductor bars.

All HOLDEN Furnaces are designed with water-cooled connections to prevent voltage drop at terminal connections.

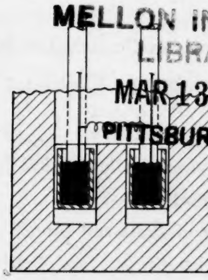
Electrodes can be changed by removing only two bolts—a time-saving feature!

Guarantee—Ceramic pot life . . . 1 to 5 years, depending on temperature.



← 7″ Liquid electrode pools average 200° F. lower temperature.

Simple resistance coil for restarting. →



THE A. F. HOLDEN COMPANY

P. O. Box 1898
New Haven, Connecticut

1130 Schaefer Highway
Detroit 27, Michigan

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIV, No. 2 FEBRUARY, 1951

CONTENTS

MARJORIE R. HYSLOP, Editor
RAY T. BAYLESS, Publishing Director
GEORGE H. LOUGHNER, Production Manager

• • •

A. P. Ford, Advertising Manager
7301 Euclid Ave., Cleveland 3, Ohio
UTah 1-0200

Harry L. Gebauer
John F. Tyrrell
Division Managers
55 West 42nd St., New York 18
CHickering 4-2713

Don Harway, West Coast Rep.
1709 West 8th St., Los Angeles 14
DUnkirk 2-8576

• • •

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Walter E. Jominy, President; John Chipman, Vice-President; William H. Eisenman, Secretary; Ralph L. Wilson, Treasurer; Thomas G. Digges, Elmer Gammeter, James B. Austin, James T. MacKenzie, Trustees; Arthur E. Focke, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers in Central Europe, Asia, or the Pacific islands other than Hawaii, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

Western Metal Congress and Exposition

Time: March 19-23, 1951
Place: Oakland, Calif.
Theme: Production for America

WITH an emphasis forced by the critical world situation and forthcoming economic controls, the seventh Western Metal Congress and Exposition, to be held in Oakland, Calif., March 19 through 23, will be the most important in history. It will affect thousands of persons and attempt to answer problems important to the entire industry, the nation, and the world.

How can production be increased? How can costs be held down? What new equipment and processes can be used most advantageously? Hundreds of exhibits, scores of seminars, discussions, and papers will all be directed toward these timely, important subjects.

And what is equally important and staggering, what material shall be used? For rearmament the proper materials will be provided, but for production of civilian products, what metal shall be used in place of the scarce metal? What low-alloy steel will come nearest to filling the bill? Is there a substitute material that will answer the purpose?

The theme of the Western Metal Congress and Exposition—"Production for America"—will be divided into two phases—production for defense or rearmament, and production for civilian or non-emergency use. The urgent haste toward preparedness makes the metal industry, with its many facets and allied manufactures, particularly cognizant of the need for speeding up production.

Principal object of the five-day Oakland meeting and show will be to devise the means for achieving the maximum increase in production in the minimum period of time at the most reasonable cost. All new methods to be demonstrated will prove of particular significance and advantage to contractors who are likely to be involved in new restrictions.

The need for conservation of strategic materials and substitution of others needed less urgently will be stressed not only by all speakers at the Congress but by all exhibitors in the Exposition halls.

In the days to come, rearmament contractors will, of course, have first priority in securing necessary materials; yet America must have civilian production also, and as an aid in that respect the Congress and Exposition will perform an invaluable function. Manufacturers will have to start using less of the scarce elements as well as substitutes for the strategic metals; new and substitute materials will be the order of the day. These important and timely subjects will be the principal theme of the discussions and sessions, with world authorities present to report on these phases of conservation, utilization and substitution for scarce and strategic metals.

The Western Metal Congress and Exposition is sponsored by the American Society for Metals with the cooperation of 20 national and local groups (see below). Special programs are being sponsored by the American Welding Society, the American Foundrymen's Society and the Society for Non-Destructive Testing. The technical program of the American Society for Metals has been so planned that it will be of specific and general interest not only to A.S.M. members, but to the members of the other cooperating societies as well.

Two of the most important west coast industries—aircraft manufacture and the oil industry—will be featured in special sessions on Monday and Friday, March 19 and 23, respectively. A seminar on service failures, a round-table discussion of corrosion failures, and a session on metallurgical problems of the small manufacturer are included in the program.

One of the most important dates of the Congress will be Wednesday, March 21, when the entire day will be given over to a panel discussion of conservation, utilization and substitution for strategic and scarce materials. Likewise, a highly instructive "Business Forum" on Thursday morning will be conducted by top executives in metal producing and consuming industries.

The tentative programs of the A.S.M. and American Welding Society sessions appear on pages 6 and 7, while the programs of the American Foundrymen's Society and the Society for Non-Destructive Testing are to be announced.

COOPERATING TECHNICAL SOCIETIES

American Society for Metals, Sponsor

American Chemical Society
American Foundrymen's Society
American Institute of Chemical Engineers
American Institute of Electrical Engineers
American Institute of Mining and Metallurgical Engineers
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Testing Materials
American Society of Tool Engineers
American Welding Society
Institute of Aeronautical Sciences
Mining Association of California
National Association of Corrosion Engineers
National Association of Lubricating Engineers
Pacific Coast Electrical Association
Pacific Coast Gas Association
Purchasing Agents' Association of Northern California, Inc.
Society of Automotive Engineers
Society for Non-Destructive Testing
Western Oil and Gas Association

Exhibitors in Western Metal Exposition

Oakland Civic Auditoriums, Oakland, Calif., March 19 through 23, 1951

Air Reduction Pacific Co.
Ajax Electric Co., Inc.
Aktiebolaget Kanthal
Allen Manufacturing Co.
American Pullmax Co.
Andreassen & Co., Inc.
Austenal Laboratories, Inc.
Automatic Temperature Control Co., Inc.

Baldwin-Lima-Hamilton Corp.
Bausch & Lomb Optical Co.
Beets Co., Henry N.
Black & Decker Mfg. Co.
Braeburn Alloy Steel Co.
Braun-Knecht-Heimann Co.
Brown Instruments Div.
Bruning Co., Inc., Charles
Buehler, Ltd.
Bundy Tubing Co.

California State Polytechnic College
Central Scientific Co.
Clementina Co.
Coffing Hoist Co.
Columbia Steel Co.
Commander Manufacturing Co.
Commercial Shearing & Stamping Co.
Coulter Steel & Forge Co.
Crane Packing Co.
Crucible Steel Co. of America

De Castro & Associates
Despatch Oven Co.
Detrex Corp.
Distillation Products Industries Div.
DoAll Co.

Eclipse Fuel Engineering Co.
Erb & Gray
Eutectic Welding Alloys Corp.

General Electric X-Ray Corp.
General Metals Corp.
Goodrich Co., B. F.

Handy & Harman
Haynes Stellite Div. U.C.C.
Heli-Coil Corp.
Hevi Duty Electric Co.
Houghton & Co., E. F.

Illinois Testing Laboratories, Inc.

Jarrell-Ash Co.
Jelliff Manufacturing Co., C. O.
Jenkins Publications, Inc.
Jensen Instrument Co.

Kanthal Corp.
Kelite Products, Inc.
Knapp Co., James H.

Leeds & Northrup Co.
Le Field Mfg. Co.
Leitz, Inc., E.
Lincoln Electric Co.
Linde Air Products Co.
Livingstone Engineering Co.

Macaulay Foundry Co., H. C.
Magnaflux Corp.
Mallory & Co., Inc., P. R.
Matheson Co., Wm. C.
Merrill Brothers
Michigan Tool Co.
Milne & Co., A.
Minneapolis-Honeywell Regulator Co.

EXPOSITION HOURS

Monday, Tuesday, and Wednesday
Noon until 10:30 p.m.

Thursday and Friday
10:00 a.m. until 6:00 p.m.

Mir-O-Col Alloy Co., Inc.
Modernair Corp.
Montague-Harris & Co.

National Diamond Laboratory
National Spectrographic Laboratories, Inc.
National Welding Equipment Co.
Nelson Stud Welding Div.
North American Phillips Co., Inc.
Norton Co.

Oakite Products, Inc.
Olsen Testing Machine Co., Tinius
Osborn Manufacturing Co.

Pacific Brass Foundry
Pacific Gear & Tool Works
Pacific Oxygen Co.
Pacific Scientific Co., Inc.
Pacific Steel Castings Co.
Partlow Corp.
Perlmuth-Colman & Associates
Physicists Research Co.
Precision Metalsmiths, Inc.

Reeves Pully Co.
Ryerson & Son, Inc., Jos. T.

Simonds Saw & Steel Co.
South Western Gear Works
Sperry Products, Inc.
Stuart Oxygen Co.

Taylor-Spotswood of Calif.
Tempil Corp.
Tinnerman Products, Inc.

Union Carbide & Carbon Corp.
United States Steel Co.
United States Steel Export Co.
United States Steel Supply Co.
Unitek Corp. of Pasadena

Victor Equipment Co.
Vlier Manufacturing Co.

Waldron Corp., John.— Flexible Coupling Div.
Wells Manufacturing Co.
Western Gear Works
Western Industry
Western Machinery & Steel World
Western Metals
Western Tool & Supply Co.
Westinghouse Electric Corp.
Westinghouse Pacific Coast Brake Co.
Wheelco Instrument Co.
Wilson Mechanical Instrument Co.

HOTELS IN OAKLAND

Claremont	Lakehurst
Coit-Ramsey	Leamington
Harrison	Moose Club
Lake Merritt	St. Mark

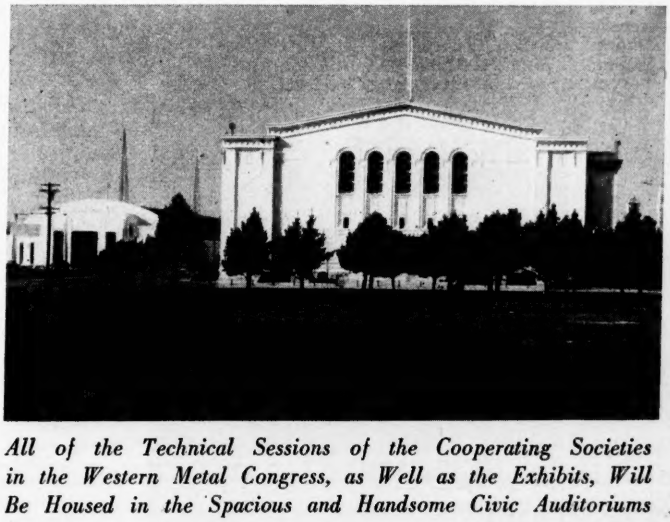
Hill-Castle Apartments

IN SAN FRANCISCO

Alexander Hamilton	Fairmont
Californian	St. Francis
Drake-Wiltshire	Stewart
El Cortez	Whitcomb

(20 minutes by Key Route cars to Oakland Auditoriums)

If you require hotel accommodations, write direct to the hotel of your choice, giving number and names in party, date of arrival and departure, and rate of room desired.



All of the Technical Sessions of the Cooperating Societies in the Western Metal Congress, as Well as the Exhibits, Will Be Housed in the Spacious and Handsome Civic Auditoriums

TECHNICAL PROGRAM OF AMERICAN SOCIETY FOR METALS

Western Metal Congress, Oakland Civic Auditoriums

Monday, March 19

Recent Developments in Materials and Methods for Aircraft Manufacture

Morning Session—10:00 a. m.

Modern Trends in Aircraft Structural Design in England—speaker to be announced.
Modern Trends in Airframe Materials in America, by Leo Schapiro, Douglas Aircraft Co., Inc.
Metal Fabrication Processes, by Alfred H. Petersen, Lockheed Aircraft Corp.

Afternoon Session—2:00 p. m.

Joining and Assembly Techniques, by T. E. Piper, Northrop Aircraft Inc.
Selection of Materials for Jet Engines, by Arthur W. F. Green, Allison Division of General Motors Corp.

Tuesday, March 20

Seminar on Service Failures

Morning Session—10:00 a. m.

Mechanical Failures

Coordinator: John E. Dorn
Prof. of Mechanical Eng., University of Calif.

Subjects for Round-Table Discussion:
High-Temperature Fractures
Low-Temperature Fractures
Fatigue Fractures
Weld Fractures
Tool and Die Failures
Failures Due to Wear

Speakers:
Arthur E. Focke, Diamond Chain Co., Inc.
J. B. Dotson, Nordstrom Valve Co.
J. T. Leyden, Crucible Steel Co.
Arthur W. F. Green, Allison Div., G.M.C.
Walter E. Jominy, Chrysler Corp.

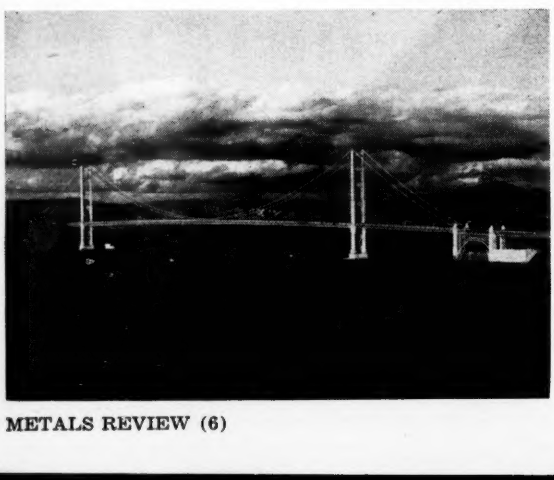
Afternoon Session—2:00 p. m.

Corrosion Failures

Coordinator: George A. Nelson
Shell Development Co.

Subjects for Round-Table Discussion:
General Corrosion
Stress-Corrosion
Corrosion Fatigue
Problems in Aircraft Industry
Problems in Oil Industry

Speakers:
James T. Waber, Los Alamos Scientific Lab.
Samuel L. Hoyt, Battelle Memorial Institute
V. N. Krivobok, International Nickel Co.



Wednesday, March 21

Conservation, Utilization and Substitution for Strategic and Scarce Materials

Morning Session—10:00 a. m.

Nonferrous Metals

Moderator: Ernest E. Thum, Editor of *Metal Progress*

Subjects for Round-Table Discussion:
Copper, Zinc, Tin, Lead and Their Alloys
Light Metals: Aluminum, Magnesium, Titanium
Nickel and Chromium and Their Alloys
Stainless and Heat Resisting Steels
New and Rarer Metals

Panel Members:
E. H. Weaver, Union Oil Co.
J. D. Hanawalt, Dow Chemical Co.
V. N. Krivobok, International Nickel Co.
Ralph L. Wilson, Timken Roller Bearing Co.
W. L. Finlay, Rem-Cru Titanium, Inc.

Afternoon Session—2:00 p. m.

Alloy Steels

Moderator: Ernest E. Thum, Editor of *Metal Progress*

Subjects for Round-Table Discussion:
Iron and Steel Supplies
Conservation of Critical Alloys
Use and Heat Treatment of Alloy Steels With Minimum Alloy
Selecting Low-Alloy Steels by Their Hardenability
Toolsteels and Tool Materials

Panel Members:
James B. Austin, U. S. Steel Corp.
Elmer Gammeter, Globe Steel Tubes Co.
John Chipman, Massachusetts Institute of Technology
Thomas G. Digges, National Bureau of Standards
Walter E. Jominy, Chrysler Corp.
Fred J. Robbins, Plomb Tool Co.

Thursday, March 22

Morning Session—10:00 a. m.

Business Forum

(A joint meeting with Oakland and San Francisco Chambers of Commerce, California Manufacturers Association and California State Chamber of Commerce. Speakers will be top executives in metal producing and consuming industries.)

Noon—Subscription Luncheon

Lake Merritt Hotel

Presiding: Governor Earl Warren

Afternoon Session—2:00 p. m.

Metallurgical Problems of the Small Manufacturer

Selection of Materials for Manufacturing of Small Equipment, by Reno R. Cole, Friden Calculating Machine Co.
Reducing Wear by Proper Metallurgy, by Walter E. Jominy, Chrysler Corp.
Casting Potentials to Replace Forgings, by H. H. Harris, General Alloys Co.

Friday, March 23

Morning Session—10:00 a. m.

Metallurgical Problems in the Oil Industry

Engineering Considerations Governing Selection of Materials, by K. V. King, Standard Oil Co. of California
Progress in Process Construction Materials, by George A. Nelson, Shell Development Co.
Trends in the Development of Special Alloys Applicable to the Oil Industry, by Ralph Wilson, Timken Roller Bearing Co.

TECHNICAL PROGRAM OF AMERICAN WELDING SOCIETY

Monday, March 19

Morning Session—10:00 a. m.

Bridge Structural Welding, by L. C. Hollister, Bridge Engineering Div., California State Highways

Structural Welding, by LaMotte Grover, Air Reduction Sales Co.

Luncheon—12:15 p. m.

A.W.S. Official Convention Luncheon

Afternoon Session—2:00 p. m.

Quality Control of Structural Resistance Welding in Aircraft, by J. R. Fullerton, Ryan Aircraft Co.

Recent Developments in Brazing and Welding of Copper, by James T. Kemp, American Brass Co.

Tuesday, March 20

Morning Session—10:00 a. m.

The Welding and Metallurgical Phase of Large-Diameter High-Strength Cold Worked Pipe and Some Interesting Notes Relative to Its Testing, by W. A. Saylor, Consolidated Western Steel Corp.

Recent Developments in Flame Cutting, by T. T. Parker, Kaiser Steel Corp.

Afternoon Session—2:00 p. m.

Conserving Industrial Resources With Automatic Hard Facing and Surface Build-Up, by T. R. Brashear, Leader Welding & Mfg. Co.

Shielded-Arc and Submerged-Arc Welding as Used in the Centrifugal Pump Industry, by F. R. Drahos, Byron Jackson Co.

Applied Welding Engineering, by Gilbert S. Schaller, University of Washington.

Wednesday, March 21

Morning Session—10:00 a. m.

Welding Jet Component Parts, by G. L. Richardson, General Electric Co.

Semi-Automatic Inert-Gas Metal-Arc Welding, by L. Robbins, Mare Island Naval Shipyard

Afternoon Session—2:00 p. m.

Fundamentals of Inert-Gas Shielded-Arc Welding, by H. E. Rockefeller, Linde Air Products Co.

The Role of Aircomatic Welding in a Defense Production Economy, by J. H. Berryman, Air Reduction Pacific Co.

Welding of Stainless Steels and Its Effect on Corrosion Resistance, by E. W. Hopper, Crucible Steel Co. of America.

Thursday, March 22

Morning Session—10:00 a. m.

Business Forum

Afternoon Session—2:00 p. m.

Flash Welding of Mild Steel and High-Strength Alloys for High-Speed Production, by Charles Smith, Douglas Aircraft Co.

Kaiser Steel 14-In. Electric Weld Process, by R. G. Reigel, Kaiser Steel Corp.

This Is Resistance Welding; Movie by General Electric Co.

Friday, March 23

Morning Session—9:00 a. m.

Progress Report on Welding Processes, by T. B. Jefferson, editor, *Welding Engineer.*

Should Welding Be on Its Own in Education, by R. C. Wiley, California State Polytechnic College

Education of the Welding Engineer; Open Discussion.

All Technical Sessions . . . .
of the American Society for Metals, the American Welding Society, the American Foundrymen's Society and the Society for Non-Destructive Testing will be held in the Oakland Civic Auditoriums

GENERAL COMMITTEE FOR WESTERN METAL CONGRESS

Chairman: Harry E. Lewis
Pyromet Brazing and Heat Treating Co.

Secretary: Harry E. Krayenbuhl
Oliver United Filters, Inc.

Vice-Chairman: Bertram W. Depew
General Electric Co.

Vice-Chairman: Philip McCaffery
General Metals Corp.

Vice-Chairman: E. A. Daniels
Victor Equipment Co.

SPECIAL CHAIRMANSHIPS

Attendance:
Guy M. Winton
Allegheny Ludlum Steel Co.

Exhibits:
G. B. Berlien
Industrial Steel Treating Co.

Plant Inspection:
Fred I. Donlevy
Caterpillar Tractor Co.

Cooperating Societies:
George A. Nelson
Shell Development Co.

Housing:
Charles A. Blesch
Natural Gas Equipment Co.

Program:
Earl R. Parker
University of California

Entertainment:
Paul C. Childs
Earle M. Jorgensen Co.

Information and Registration:
Thomas S. Hutton
Thomas S. Hutton & Son

Publicity:
W. A. Fletcher
E. F. Houghton & Co.

Young Fellows Hear Evans

A Representative Group of Chicago Young Fellows Includes (From Left): Walter Heffron, Revere Copper and Brass Co.; H. A. Knowlton, Wisconsin Steel Co.; H. A. Anderson, Jr., University of Chicago; J. F. Cubbidje, Western Electric Co.; J. W. Barnett, Lindberg Engineering Co.; C. R. Norlander, Revere Copper and Brass Co.; and A. J. Jarema, Lindberg Engineering Co.

Reported by Thomas S. Simms
Research Information Service
John Crerar Library

The young members of the Chicago A.S.M. were honored at the November meeting with a special "Young Fellows Night," and heard about "Recent Developments in High-Temperature Metallurgy." The principal speaker was C. T. Evans, Jr., chief metallurgist of the Elliot Co.

The first new development Mr. Evans discussed was the Kellogg electric ingot process for heat resisting alloys. In this process the raw materials are added continuously through a tube down the center of the furnace. The tube acts as an electrode and makes an arc with the surface of the molten metal collecting in the bottom of the mold. As the mold fills, the tube is raised slowly. Ingots are produced with sound centers by this process.

The properties of titanium and titanium alloys were then briefly covered. In the range between 400 and 800° F., titanium exhibits a better strength-weight ratio than either aluminum or stainless steel. This makes it a highly desirable material for aircraft operating at supersonic speeds where skin friction raises the temperature to points which eliminate the use of aluminum.

In testing materials for high-temperature applications, thermal shock testing is used on such materials as Rosslyn Metal (copper clad with stainless or Inconel), ceramals and ceramics. Stainless or Inconel-clad copper was found to stand up best under these tests. The ceramic materials, although exhibiting very good strength-weight ratios, are limited in their applications because of their low resistance to thermal shock.

The speaker described a stress-rupture test employing a cup around the specimen. The cup is filled with various ash compositions to test their corrosiveness on different superalloys at elevated temperatures. A typical coal ash composition contains mostly silica, alumina, and iron oxide.

Vanadium present in ash is very corrosive to alloys at high temperatures. Vanadium compounds are generally found in oil ash and cause a great deal of trouble by corrosion at temperatures above about 1100° F. At 1350° F. it was found that when the vanadium oxide varied from 0 to 2% little corrosion was produced, and when over 2% severe corrosion resulted.

Mr. Evans concluded his talk with an interesting discussion on the behavior of the superalloys in atmospheres of helium or argon at elevated temperatures. Hastelloy-C is weaker in these atmospheres than in air at 1600° F.

Steel Industry Makes Good Use of Quality Control

Reported by William W. Wentz
Pennsylvania State College

How "Metallurgical Quality Control" can be put to good use in the steel producing industry was indicated by H. J. Forsyth, assistant director of steel conservation for Republic Steel Corp., who addressed the Penn State Chapter A.S.M. at its December technical meeting.

Mr. Forsyth pointed out that ingot quality is largely determined by the size of the pipe, the condition of the surface, and the grain size. Ingot surface quality is very important in controlling billet and rolled product surface quality.

Mr. Forsyth's talk was illustrated with lantern slides which depicted the changes in ingot surface conditions brought about by variations in ladle nozzle diameter, mold condition, mold coatings, mold temperature at time of coating, soaking temperature, and soaking time.

Kaiser Reports on Library Use of Punch Card System

One of the first library uses of the ASM-SLA Metallurgical Literature Classification and punched-card system completed a year ago has been reported by the division of metallurgical research of Kaiser Aluminum and Chemical Corp.

Prior to the installation of the punched-card system, research reports had been filed merely by number, and a great deal of time was required to locate and scan material for a complete dossier on any given subject. It is in this field that the punched cards are proving to be of the greatest value to both the staff members and the librarian.

To supplement the reports with information published in papers related to parallel projects, Miss Alvina Wassenberg, librarian, has enlisted the aid of all staff members in the organization. Investigators finding a published article of interest in their field call it to her attention and indicate the way they wish it to be coded. Miss Wassenberg then punches the cards to conform to the code, and the information in the article is ready for reference by any investigator.

Thus, in addition to research reports and references selected from the A.S.M. Review of Metal Literature, the punched cards include references to bulletins, preprints from engineering societies, government reports, and patents.

Miss Wassenberg estimates that the system will serve well in its present form for the next few years. At the end of that time, the number of cards will be too great for convenient handling by a complete single "needling" operation. However, when the volume reaches the cumbersome stage, she plans to separate the cards according to the main division of the classification outline.

A full account of the procedures used in the Kaiser research library will be published in a forthcoming issue of either *Metal Progress* or *Metals Review.*

Fellowships Announced

The 18th annual program of Tau Beta Pi fellowships for graduate study in engineering during the school year 1951-52 has been announced. All Tau Beta Pi members are eligible. Each award is in cash in the amount of $1200, payable in ten monthly installments.

Applications must be mailed by Feb. 28, 1951. Complete details may be obtained from Paul H. Robbins, director of Fellowships, Tau Beta Pi, 1121 15th St., N.W., Washington 5, D. C.

THIRTY YEARS AGO

The news columns in A.S.M. *Transactions* 30 years ago reveal that membership drives were actively under way by most of the chapters in early 1921. The January issue reprints a letter by HORACE C. KNERR, chairman of the Membership Committee of the Philadelphia Chapter, which was unusually effective in arousing interest in the Society.

—30—

JOSEPH V. EMMONS, metallurgist of Cleveland Twist Drill Co. (now chief metallurgist) did a lot of traveling during the winter of 1920-21, addressing a number of chapters on "Tool Hardening Problems".

—30—

M. H. MEDWEDEFF, recently retired after many years with AC Spark Plug Div. of G. M. C. in Flint, Mich., addressed the Baltimore Chapter on "High Speed Steel".

—30—

Philadelphia Chapter heard G. W. TALL of Leeds & Northrup Co. (currently vice-president in charge of sales) speak on "Hump Method of Heat Treatment".

—30—

Under "Commercial Items" in the January issue appears the announcement that "H. H. HARRIS, manager of the metals division of the Quigley Furnace Specialties Co., New York, has purchased from the Quigley company this department including all rights related to the products and will handle this business on a more extensive scale under the name of the General Alloys Co."

—30—

A speaker before the North West Chapter was G. A. RICHARDSON of Midvale Steel and Ordnance Co. Mr. Richardson is still in Philadelphia and is currently sales manager for Metlab Co.

—30—

Under "Commercial Items" Sauveur & Boylston announced the appointment of H. M. BOYLSTON to the chair of metallurgy at Case School of Applied Science (now Case Institute of Technology), but stated that the firm would continue its laboratories and offices in Cambridge, Mass., under the supervision of Prof. ALBERT SAUVEUR.

—30—

W. E. JOMINY, then metallurgist for Packard, now staff engineer for Chrysler, and currently national president of A.S.M., addressed the Cleveland Chapter in December 1920 on "The Selection and Treatment of Materials for Automobiles".

—30—

SAMUEL L. HOYT'S early work on impact testing was recounted to the Cleveland Chapter early in 1921 under the title "Impact Properties of Metals and Notch Tests". Dr. Hoyt, at present technical adviser at Battelle Memorial Institute, was at that time metallurgical engineer of the experimental laboratores of the National Lamp Works, Cleveland.

Electrodeposited Coatings Evaluated

Left to Right at the November Meeting of the Los Angeles Chapter Are: Wm. F. Nash, Jr. of C. F. Braun Co., Vice-Chairman; C. D. D'Amico of Jos. T. Ryerson and Son, Inc., Chairman; C. H. Sample of International Nickel, Speaker; Wm. J. Parsons of Pacific Scientific Co., Secretary-Treasurer; and J. B. Morey of International Nickel, Past Chairman

Reported by James R. Cady
University of Southern California

The effectiveness of electrodeposited lead, zinc, cadmium, copper-nickel-chromium and nickel-chromium coatings in preventing corrosion was evaluated by Clarence H. Sample of International Nickel Co., speaking before the Los Angeles Chapter A.S.M. on Nov. 16. A group of color slides was used to show the effect of industrial, rural and marine atmospheres, as well as accelerated corrosion test conditions, on the performance of these coatings.

About 17 metals and alloys of widely different properties can be used for electrodeposited coatings. They range from the strongly electronegative cadmium and zinc to the noble metals.

Climatic conditions have an important effect on the behavior of coatings. Sulphur gases in industrial atmospheres cause zinc and cadmium to deteriorate faster than lead, but in the country the electronegative metals are better. One method of estimating the corrosive nature of a particular climate is to check the conditions of old automobiles. In inland rural areas the electroplated coatings are frequently in better condition than the paint, but in industrial cities the opposite is generally true.

Porosity of electrodeposited coatings may be caused by inclusions in the steel or by dirty plating baths. Both the measurement of porosity and its prevention in thin coatings are difficult. Buffing between two nickel coats gives a great improvement in resistance to corrosion over the same thickness of nickel applied in one operation.

285 Attend Milwaukee Course on Heat Treating

A highly successful educational lecture course on "Fundamentals and Practical Applications of Heat Treating" was completed by the Milwaukee Chapter A.S.M. on Nov. 27. Attendance for the five lectures of the course averaged 285; of this attendance, 152 received certificates for 100% attendance.

The course was free to A.S.M. members, while nonmembers paid a registration fee of $5, which could be applied to the first year's dues on a regular membership in the Society. J. M. Beyerstedt of Nordberg Mfg. Co. was chairman of the Educational Program Committee. The subjects and lecturers were as follows:

Oct. 30—Fundamentals of Heat Treating, by F. T. McGuire, Deere & Co.

Nov. 6—Variations in Hardening, by R. D. Webb, Carnegie-Illinois Steel Corp.

Nov. 13—Heat Treatment of Carbon and Alloy Constructional Steels, by E. J. Wellauer, Falk Corp.

Nov. 20—Surface Heat Treatments for Steels, by N. O. Kates, Lindberg Steel Treating Co.

Nov. 27—Coordinating Design, Material, Manufacturing and Heat Treating for Economy and Service, by H. B. Knowlton, International Harvester Co.

Misstatement Corrected

Attention has been called by L. F. Yntema, director of research for Fansteel Metallurgical Corp., to an error in the report of his talk before the Mahoning Valley Chapter A.S.M. in December *Metals Review,* page 11. The statement is made that "tantalum is resistant to corrosion by hydrochloric acid in concentrations up to 70%." It should have been said that tantalum is resistant to this acid in all concentrations.

Latest Pneumatic System Of Steelmaking Is New Turbo-Hearth Process

Reported by George Sorkin
Metallurgist U. S. Navy Bureau of Ships

Development of pneumatic processes of steelmaking, which culminated in the new turbo-hearth process, was traced before the members of the Washington Chapter A.S.M. at their November meeting. The speaker was Shadburn Marshall, research associate of Carnegie-Illinois Steel Corp., whose contributions to the latest phases of the development have been noteworthy.

The turbo-hearth process is essentially a method for the production of steel low in nitrogen and phosphorus in a basic converter using pig iron made from "basic ores". Low pressure air is blown through jets over the *surface* of the molten charge. In current converter practice (acid bessemer and basic Thomas), air is blown *through* the charge and tends to give high nitrogen contents. The turbo-hearth depends on a slag-metal reaction and thus eliminates nitrogen pick-up.

Four conditions exist which indicate that the turbo-hearth process will find a place among American steelmaking methods as soon as the operating, design and maintenance problems are licked: They are:

1. The bulk of American ore produces pig iron which has higher phosphorus and lower silicon than is required for the acid, bottom-blow bessemer converter.

2. This ore is likewise not satisfactory for the basic bottom-blow Thomas converter because the silicon is too high and the phosphorus too low in the resulting pig iron.

3. Surface-blown acid converters require low-phosphorus pig iron.

4. The basic openhearth yields a satisfactory product from available pig iron, but is slow, expensive and requires fuel.

Development work at Battelle Memorial Institute under a cooperative arrangement with Carnegie-Illinois Steel Corp., pointed to some distinct advantages. In 32 1000-lb. heats without special charge materials, as much as 97% of the phosphorus and 50% of the sulphur was eliminated. Most of the silicon and manganese are burned out in about 5 min. Carbon and phosphorus are eliminated together, and thus a sharp end-point occurs; an afterblow with rapid oxidation of iron is not necessary to remove the phosphorus as is required in the Thomas process. The process can be speeded up by increasing the rate of air input.

The Battelle tests proved the process to be metallurgically sound and, accordingly, 15 heats of 25 to 30 tons were made in cooperation with the Jones and Laughlin Steel Corp. Although operating problems were practically insurmountable at the time, the larger heats corroborated the results of the laboratory tests. The steel produced by the turbo-hearth process was considered equal in quality to openhearth steel of similar analysis.

Dr. Marshall indicated that the future of the process depends largely on economic considerations. The temperatures attained in the experimental work indicated that up to 10% scrap can be used directly in the turbo-hearths.

Ladies Treated to Dual Program

Shaking Hands Are the Two Speakers for Indianapolis Chapter's Ladies' Night. At left is Joe Pierson of the Chamber of Commerce, and at right, Frank Butters, plastics expert. Center is John Mitchell, chapter chairman

Reported by John C. Wagner
Head, Metallurgical Section
Research and Test Department
Indianapolis Naval Ordnance Plant

The combination of Ladies' Night (with corsages provided) and two excellent speakers helped make Dec. 18 an outstanding success for the Indianapolis Chapter A.S.M.

The first part of the program featured Frank Butters, who is affiliated with Mycalex Corp. of America and is also a plastics consultant. His talk was highlighted by an exhibit of many plastic materials and gadgets. Mr. Butters presented a highly technical subject in an interesting and understandable manner. He also pleased the metallurgists by showing that there are many applications where metals are much more useful and practical than plastics. (Of course, he was careful to make it clear that often the reverse is also true.)

The next speaker was Joe Pierson of the Indianapolis Chamber of Commerce, whose talk was titled "Is This the Age of Reason or Treason?" Communists go out of their way to avoid the use of bullets and guns when taking over a country, he pointed out. They have a much more subtle method—the use of an idea.

Both Mr. Pierson's and Mr. Butters' talks were greeted with enthusiastic applause from wives and metallurgists alike.

Shows Relation Between Sales and Engineering

Reported by Edward M. Mielnik
Asst. Prof. of Mechanical Engineering
State University of Iowa

Pointing out that a close relationship exists between sales and engineering, and that a well-engineered product is already half sold, Verne R. Martin presented many pertinent points on "Sales Promotion" before the November meeting of the Cedar Rapids Chapter A.S.M. Mr. Martin, who is general sales manager of the Maytag Co., told how and where his company sells $70,000,000 worth of electrical appliances annually.

The development and execution of a dominant sales program approaches an exact science, Mr. Martin maintains. In describing Maytag's sales organization, he explained that his department deals in "specifics and not generalities". This policy is carried throughout the entire sales program, whether in hiring sales personnel or in making out a questionnaire.

The talk was enthusiastically received by the membership, and the meeting finally had to be terminated so that the speaker and his assistant, Mr. George C. Owen, could leave.

Recounts Experiments on Recovery of 18-8 From Intergranular Corrosion

Reported by F. R. Morral
Department of Materials Engineering
Syracuse University

The pros and cons of stainless steels were presented by R. N. Gillmor of G. E.'s local Electronics Park before the Syracuse Chapter on Jan. 2. To explain the reason for the classification of stainless steels into austenitic, martensitic and ferritic groups, Mr. Gillmor quoted phase diagrams and dilatometer curves. He then discussed various phases of fabrication such as welding, silver brazing and soldering. Certain precautions must be taken in these operations, he said, because of the characteristics of the three types of steel and the effect of such inherent properties as coefficient of expansion, heat conductivity and electrical resistance.

The problem of identifying these various materials is often encountered at the plant, so the speaker briefly reviewed the usefulness of the nitric acid test, the magnet, and other criteria such as hardness measurements, the microscope, sulphur prints and the copper sulphate, or Strauss test.

Because corrosion resistance in a variety of media is one reason for the use of stainless steels, the speaker reviewed several theories of passivity and some results of accelerated tests. Heat treatment, surface (after grinding or just scratching with a steel nail), and cold work are all factors that influence corrosion behavior.

Mr. Gillmor presented some of his work on the mechanism of carbide precipitation and recovery from intergranular attack on 18-8. Samples of this steel held for periods up to 1000 hr. at 1000, 1240, and 1500° F. were examined microscopically (using nital etch, Murakami's reagent and electrolytic etch in oxalic acid) and tested for intergranular corrosion. The samples at 1240 and 1500° F., whether fine or coarse-grained, showed decided deterioration after a certain time, but on holding for longer times, the intergranular attack lessened and the material actually recovered.

Microscopically, it was established that the carbides were present all along, and the speaker believes that the chromium from the grain travels to the chromium-impoverished regions left after the carbide precipitation, and replenishes them, thus making them resistant to intergranular attack. He suggested that a systematic study be made to determine isothermal curves and establish the shortest time cycle necessary to cause recovery. This treatment may be necessary in view of the restrictions imposed on stabilizing agents (columbium) and the disadvantages of titanium-stabilized stainless.

The desirability of using low-carbon stainless steel was pointed out, although there are some difficulties in obtaining it at this time.

Appointed to A.S.M. Staff In New York Sales Office

John F. Tyrrell has been appointed to the staff of the American Society for Metals with headquarters in the Society's New York sales office. Mr. Tyrrell, a former officer of the San Diego Chapter, comes to A.S.M. from Solar Aircraft Co., where he has been research metallurgist since 1946.

J. F. Tyrrell

Mr. Tyrrell was graduated from M. I. T. in 1943. After a year of metallurgical experience with Allegheny Ludlum Steel Corp., he joined the Navy and served as executive officer on LST and LSM ships in the Pacific.

Mr. Tyrrell is known to A.S.M. members through his publications in *Metal Progress* and the *Transactions*. Most recent of these was the timely article "Conservation of Columbium", which inspired correspondence from 56 engineers in the November issue of *Metal Progress*.

As an ASM representative in New York, Mr. Tyrrell will be responsible for sale of advertising space in the Society's publications in the eastern United States.

Tatnall Gives Chalk Talk

Reported by Malcolm G. Simons
Pressed Metals of America, Inc.

Members of the Detroit Chapter A.S.M. were treated to a thoroughly enjoyable "chalk talk" by Francis G. Tatnall on Jan. 9. Mr. Tatnall is manager, testing research, Baldwin-Lima-Hamilton Corp.

Making use of both blackboard illustrations and word descriptions, the speaker showed how the metallurgist and the engineer both rely on experimental stress analysis to solve problems of design.

The coffee talk was presented by D. E. Trefry of the Detroit Edison Co., a director of the Michigan Society of Professional Engineers. Mr. Trefry explained the registration for professional engineers in the State of Michigan, particularly as pertains to metallurgical engineers.

Almen Is Speaker for Ontario

Reported by A. F. Mohri
Chief Metallurgist
Steel Co. of Canada, Limited

Ontario Chapter opened its 1950-51 season with Past Chairmen's Night at the Royal York Hotel in Toronto on Oct. 6. All past chairmen present, including one who had held the position 25 years ago, were given roses as a badge of honor.

J. O. Almen, research consultant for General Motors Corp., was the principal speaker, his subject being "Residual Stress and Fatigue in Metals", with particular emphasis on the behavior of steel. Mr. Almen's talk has been previously reported in *Metals Review*.

Mahoning Valley Entertains Officers

A.S.M. National President Walter Jominy and Secretary W. H. Eisenman Visited the Mahoning Valley Chapter in November. From left are: Secretary Eisenman, William Baumgarten, chapter secretary; Mr. Jominy, and Harold Johnson, chairman. (Reported by H. A. Holberson)

Nondestructive Testing Plays Important Role in National Defense Production

Reported by William J. Murphy

Metallurgy students from colleges in the Lehigh Valley were feted at the first annual Students' Night of the Lehigh Valley Chapter A.S.M. on Dec. 1. The meeting, which was attended by over 170 students and members, began propitiously with dinner followed by a coffee talk by Charlie Berry, American League umpire.

The evening's technical subject, "Nondestructive Testing," was presented by S. A. Wenk of Battelle Memorial Institute. To measure the importance of nondestructive testing in terms of dollars is difficult if not impossible, he remarked in introducing his subject. It can be said, however, that production for national defense is tremendously dependent upon suitable methods of nondestructive testing.

Technically, nondestructive testing is important because it determines sound or defective products without destroying the product, and also because it eliminates the human element by the development of automatic and semi-automatic instruments.

Mr. Wenk emphasized strongly that inspection by any method is no better than the engineering information behind it. The components of any nondestructive testing method include the type of energy used, the coupling of the energy to the workpiece, pick-up of the energy from the piece, amplification and measurement of the energy, and finally interpretation of the measurements. In all respects the inspection must be thorough.

With the aid of slides, Mr. Wenk outlined many of the nondestructive testing methods. Surface defects such as cracks may be revealed by magnetic particle inspection with Magnaflux or Magnaglo, or by use of Zyglo, a fluorescent penetrant. Radiography is an extremely important nondestructive method for the detection of deep-seated defects and the inspection of assemblies. In this connection, the speaker also mentioned the new radioactive isotopes.

Deep-seated defects as well as sheet thickness and laminations are revealed by ultrasonic testing, using equipment such as the Sperry Reflectoscope. Metals may be sorted and other physical properties compared by measuring energy losses that occur when the piece is placed in a magnetic field.

New developments in nondestructive testing include "Xeroradiography". In this method, a statically charged selenium plate replaces the photographic film used in ordinary radiography. It is, therefore, a "dry" radiographic technique. The "Metal Sorter", which employs as a criterion for certain physical properties the amount of static or "tribo" electricity produced upon the work piece, is another recent development.

The technical discussion was followed by demonstrations of Magnaflux and the Reflectoscope, the former by Ross Peterson of Magnaflux Corp. and the latter by John Smack of Sperry Products, Inc.

S. A. Wenk of Battelle Memorial Institute Stands Next to a Magnaflux Unit, Which, Together With a Supersonic Reflectoscope, Was Demonstrated as an Adjunct to His Lecture on Nondestructive Testing

Oak Ridge Enrollments Open

Applications will be received until April 1, 1951, by the Oak Ridge School of Reactor Technology for enrollment in the 1951-52 session, which begins Sept. 10, 1951. This School was established at the Oak Ridge National Laboratory in March of 1950 under sponsorship of the U. S. Atomic Energy Commission for the purpose of training engineers and scientists in the field of reactor theory and technology.

A limited number of recent college graduates in chemistry, engineering, metallurgy, or physics will be accepted in the status of student-employees of the Laboratory. Other trainees, sponsored by government agencies and industrial organizations, remain on the payrolls of their home companies.

Further information and application forms may be obtained from the Oak Ridge School of Reactor Technology, Post Office Box P, Oak Ridge, Tenn.

Machinability Is Theme Of Philadelphia Lectures In February and March

Philadelphia Chapter A.S.M. is sponsoring four lectures on the machining and grinding of metals as a special educational course during February and March. The general theme of the course is "Machining and Machinability".

The first lecture on Feb. 7 was given by M. Eugene Merchant, senior research physicist of the Cincinnati Milling Machine Co. He discussed the "Basic Principles of Metal Cutting", illustrating his talk by slides and an excellent 16-mm. film.

The second lecture on Feb 14 was given by Norman E. Woldman, consulting engineer and editor of *Alloy Digest*, a new monthly magazine. His talk was titled "Machinability and the Machining of Metals and Alloys".

The third lecture will be given on March 7 by Leo P. Tarasov, research metallurgist for the Norton Co. His lecture on "Metallurgical Aspects of Grinding", based on research and field experience, will deal with the grindability of toolsteels and with trouble shooting in connection with grinding problems.

The fourth lecture, to be given on March 14 by Dr. Merchant, is titled "The Action of Cutting Fluids in Machining". Dr. Merchant's second lecture will tie the course together by covering aspects of both machining and grinding. This lecture will be illustrated by one of the 16-mm. films prepared by the Cincinnati Milling Machine Co. under the direction of Hans Ernst.

All of the lecturers can speak with authority on machining subjects. Dr. Merchant and Dr. Tarasov are both contributors to the new A.S.M. book, "Machining—Theory and Practice", while Dr. Woldman, co-author of the famed A.S.M. reference book, "Engineering Alloys", is also author of a book just off the press entitled "Machinability and Machining of Metals". Hallock C. Campbell, associate director of research and engineering for Arcos Corp., is chairman of the Philadelphia Chapter's Special Lecture Course Committee.

Drexel Completes New Building

The recently completed Alumni Scientific Laboratories Building at Drexel Institute of Technology, Philadelphia, was opened for first inspection by guests of the Institute on Dec. 12. The inspection climaxed Drexel's annual observance of Founder's Day.

The structure more than doubles the space for engineering. Metallurgical engineering, quartered since its introduction at Drexel in the Quonset huts on the same site, will be housed entirely in the new Alumni Scientific Laboratories Building.

Compliments

To NORMAN F. TISDALE, manager of sales, Molybdenum Corp. of America, on his appointment as chairman of the newly formed Advisory Council for Engineering in the Faculty of Applied Science at Queen's University, Kingston, Ont.

♦ ♦ ♦

To ZAY JEFFRIES, past national president A.S.M., on his election as an honorary member of the American Institute of Mining and Metallurgical Engineers.

♦ ♦ ♦

To ROBERT F. MEHL on his appointment as chairman of the Metallurgical Advisory Board of the National Research Council. Dr. Mehl has been granted a temporary leave of absence from Carnegie Institute of Technology, where he is director of the Metals Research Laboratory and head of the department of metallurgical engineering.

♦ ♦ ♦

To eight companies in the metals producing field, which have been awarded "Certificates of Management Excellence" for the year 1950 by the American Institute of Management. They are Aluminum Co. of America, Hudson Bay Mining & Smelting Co., Ltd., International Nickel Co. of Canada, Ltd., Kennecott Copper Corp., Phelps Dodge Corp., Scovill Mfg. Co., and United States Smelting, Refining & Mining Co.

♦ ♦ ♦

To BEN FAIRLESS, president of U. S. Steel Corp., on the award of the Bessemer Medal for 1951 of the British Iron and Steel Institute, in recognition of his distinguished services to the iron and steel industry. Also to WILLIAM BARR of Colvilles, Ltd., president of the West of Scotland Iron and Steel Institute and a member of A.S.M., on the award of the Sir Robert Hadfield Medal for 1951, in recognition of his contributions to research in steelmaking.

♦ ♦ ♦

To C. H. DESCH, a past president of the British Iron and Steel Institute, on his nomination to honorary membership in the Institute.

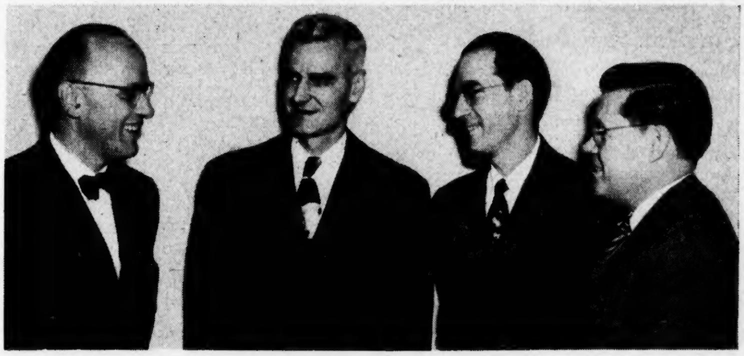
♦ ♦ ♦

To FRANCIS C. FRARY, director of the Aluminum Research Laboratories, Aluminum Co. of America, on receipt of an "Outstanding Medal of Achievement" from University of Minnesota.

♦ ♦ ♦

To C. S. BARRETT, research professor in the Institute for the Study of Metals, University of Chicago, on the award of the Mathewson Medal of the Institute of Metals Division, A.I.M.E., for the most notable written contribution to metallurgical science, published in the *Journal of Metals*.

Copper Brazing Given War Impetus



N. K. Koebel, (Second From Left), Director of Research for Lindberg Engineering Co., Was the Speaker at a Recent Meeting of the Milwaukee Chapter. Shown are (from left): E. J. Wellauer, supervisor of research and metallurgy, Falk Corp.; Dr. Koebel; Elmer Gammeter, director of research, Globe Steel Tubes Co., a national trustee; and R. C. Onan of Lindberg Engineering Co., chapter chairman

Reported by E. J. Rupert
Allis-Chalmers Mfg. Co.

The joining of metal parts with molten copper to produce a better product at a lower cost was the definition of "copper brazing" presented by Norbert K. Koebel, director of research, Lindberg Engineering Co., before the Milwaukee Chapter A.S.M. Originally termed hydrogen brazing, copper brazing is a relatively recent development pioneered about ten years ago by Delco Remy and others, he said.

Copper brazing methods during World War II were responsible for the fabrication of intricate parts in the place of expensive forgings, and facilitated the tremendous production of war materials. This wartime success of copper brazing has permanently established the method in the postwar era. Some of the latest applications are the fabrication of the Powerglide transmission and the Crosley engine.

Copper brazing is based upon the strong affinity of molten copper for clean steel. At 2050° F. the copper wets the steel and flows through the joint. A protective atmosphere is used to reduce the oxide film on the steel and to burn the air that is admitted during the charge. A flux may be used to protect the brazing compound, although in most instances it is not necessary.

Dr. Koebel then outlined a few design considerations. Fixtures are not dependable, since they will not hold at the brazing temperatures, and the material must therefore be self-supporting. The best strength in a joint is obtained with a tight fit—0.001 to 0.002 in. A properly made joint may be stronger than the parent metal. Line contacts should be avoided. The brazing material may be used in the form of wire, slugs, strip, or paste, depending upon the joint and the part.

Cast iron is difficult to braze. Cast steel can be brazed and will not lose its strength as does cast iron. A flux and a dry hydrogen atmosphere are required to braze stainless steels.

Furnaces used for copper brazing are of the Globar type, since the high carbon potential of the atmosphere would affect the conventional metallic heating elements. Pusher and conveyer-type furnaces are used, dependent upon the capacity required.

A number of copper brazed samples were available for examination after the talk.

Explains Heat Treating Steps

Reported by William Fricke
Pennsylvania State College

Peter Payson of Crucible Steel Co. of America was the principal speaker at the November technical meeting of the Penn State Chapter A.S.M. His talk, entitled "Fundamentals of Heat Treatment", outlined the principles underlying the softening and hardening of steels.

Mr. Payson's lecture was accompanied by lantern slides and photomicrographs which illustrated the results obtained from specific heat treatments. High speed steels, plain carbon toolsteels, and a medium carbon steel (4340) were used as typical examples. TTT-curves were explained in relation to the heat treating of steels.

Typical steps in heat treating are (*a*) austenitizing to dissolve carbides, (*b*) transformation to the desired product by controlling the cooling rate, and (*c*) tempering to relieve stresses.

Inland's Vice-President Forecasts Plenty of Steel For Nation's Defense

Reported by R. J. Wagner
Gary Screw and Bolt Division

Plenty of steel for defense needs and more to come as the years pass were forecast by Joseph L. Block, vice-chairman and vice-president of Inland Steel Co., addressing the Calumet Chapter A.S.M. on Nov. 14.

Speaking on "Steel for National Defense", Mr. Block took his audience back to 1930 when Inland Steel struck out boldly, built and operated the biggest continuous hot strip mill ever constructed up to that time. He pointed out that no commissar, no control board, dared to tell any American corporation not to take such a venture in such perilous times. On the contrary, this step was taken upon the conclusions of their business judgment and the ability to finance such a project.

Inland led the way with this 79-in. mill, and in 1935, when the economic skies had cleared considerably, other companies started to construct this same type of mill in even larger sizes, a few almost up to 100 in. wide.

Mr. Block cited this example of the steel industry to illustrate why we as a nation were prepared at the beginning of World War II to produce more materials, supply our armies, and the armies of other countries, and win a war. Free enterprise made this possible, the industrialist stated, and even today, Russia and its satellites, after stripping some of the conquered countries in Europe of their steelmaking capacity, and moving it to their boundaries, can still make only one-third the amount of steel that Uncle Sam can produce.

The output of American furnaces, operated at today's capacity for one year, would be 8,800,000 tons greater than last year's production of all the other countries on the face of the globe, including Russia and Communist-dominated lands.

Mr. Block definitely stated that when Uncle Sam calls, there will be plenty of steel for the defense needs, and there will be more to come as the years pass.

The steel industry is a favorite "whipping boy" for demagogues, who hurl many a falsehood about it at the unsuspecting public. We should recognize the fact that nowhere else in the world would industry dare take the steps that we have taken, and will take in the future without government control or subsidies. Yet, Mr. Block feels that for our defense requirements we do need an organization for allocation and production control. However, he strongly urges that we support the thought that such an organization should consist of men from the steel industry, even though they shall be paid by steel industry and work for the Government.

Armour Offers Fellowships

Armour Research Foundation of Illinois Institute of Technology is offering a number of industrial research fellowships in physics, chemistry, metallurgy, and other engineering fields to begin in September, 1951. Those persons awarded fellowships will attend Illinois Institute of Technology half-time and work in the Research Foundation half-time in a graduate program leading to advanced academic degrees. They are employed full-time by the Foundation during the summer.

Application forms may be obtained from the Office of Admissions, Graduate School of Illinois Institute of Technology, Chicago 16, Ill. Applications received prior to March 15 will be given first consideration.

Hear Oak Ridge Scientist

Reported by J. W. Poynter
Metallurgist, Wright Patterson Air Force Base

William E. Taylor of the metallurgy division of the Oak Ridge National Laboratory, presented a talk on "Effects of Nuclear Radiation on Metals" at the January 10 meeting of the Dayton Chapter A.S.M. The meeting was held jointly with the American Chemical Society.

Dr. Taylor discussed the fields in which nuclear research is in progress and then presented data showing the effects of nuclear radiation on some metals and alloys. His data were obtained from several declassified documents issued by the Atomic Energy Commission. Some of this material was presented in the article by Billington and Siegel in the December 1950 issue of Metal Progress, page 847.

President Speaks on Hardenability

Walter Jominy (Center), A.S.M. National President, Addressed the Philadelphia Chapter on Nov. 23 on "The Present Status of Hardenability". At left is Howard Casey, a past chairman of the Philadelphia Chapter, and at right Current Chairman Joseph Gray Jackson

Reported by George L. Schiel
Metlab Co.

Philadelphia Chapter welcomed President Jominy with a large turnout at the Engineers Club on Nov. 23.

On behalf of Secretary Eisenman, who could not be present, Mr. Jominy reported to the chapter on the current activity of the National Headquarters and its financial condition. Particularly emphasized were the future plans of the Society for the benefit of its members.

Since Mr. Jominy's technical address on "Present Status of Hardenability" will be delivered before many other chapters, the details will not be reported here.

The coffee speaker, J. H. Wood, presented an interesting discourse entitled "Character Analysis".

Tells About Use of Tracers

Reported by J. L. Foster
Metallurgist, Goodyear Aircraft Corp.

Although "Atomic Energy" was the subject presented by C. Ernest Birchenall of Carnegie Institute of Technology, at the regular December meeting of the Akron Chapter A.S.M., his talk dealt mostly with radiactive tracers and their applications in metallurgy.

Dr. Birchenall ably described the various radiactive materials that are available and their use in tracing reactions. Numerous applications in the field of metallurgy were cited.

The meeting was preceded by dinner and a coffee talk by Paul Ebert, editor of *In the Box*, the Ohio Box Board Co. publication.

Predicts Research Goals to Be Reached By the Year 2000

Reported by John F. Puterbaugh
Midwest Research Institute

Members of the Kansas City Chapter A.S.M. were unexpectedly treated to a glance into the future by C. N. Kimball, president of Midwest Research Institute, at the Chapter's October meeting. Speaking on the role of applied research in the national economy, Dr. Kimball pointed to some of the probable goals research will reach by the year 2000.

C. N. Kimball

These achievements, he predicted will cover the fields of power (new peaceful uses of atomic energy), meteorology (prediction of weather six months in advance), aeronautics (jet aircraft for passenger use with speed in excess of 1000 miles per hr.), electronics and entertainment (three-dimensional color TV bringing an end to many spectator events as now known), agriculture (one farmer will be able to supply himself and 110 others based on the present rate of advance), and mathematics (increased use of giant calculators).

Applied research is on the increase and has become big business, amounting to 2 billion dollars last year, about one-half government-sponsored. However, business in general does not yet realize the relative importance of research. Business spends 7 billion dollars annually for insurance as compared to less than one-third that amount for "competition insurance" or research.

The absence of a postwar depression in recent years was mainly averted by scientific development, Dr. Kimball believes. New products, greater economy in production, and new processes kept employment and the level of business high.

American business must learn how to use research and what to expect from it for two reasons: First, by plowing back earnings through research in good times, a place of leadership during bad times will be assured through new developments; and second, American basic or fundamental research needs a shot in the arm. Prior to World War II we were mainly dependent upon the rest of the world for leadership in basic research and the time is short for catching up.

Dr. Kimball said that the role of applied research in the present national economy is as clear-cut and important as the need for bread. The choice is either to increase our research potential or take a back seat in world competition, both politically and commercially.

Dr. Kimball concluded by outlining the facilities of Midwest Research Institute. Providing a well-trained staff of nearly 130 and superior technical equipment, the Inst tute serves both large industrial organizations and smaller firms equally as well. For industrial companies with their own research facilities, the Institute serves as an extension of the sponsoring organization's research program. For smaller organizations, Midwest Research has provided the sole means for discovery of improved processes and development of new products.

Dues Waived for Military

According to recent action taken by the Board of Trustees of the American Society for Metals, A.S.M. members who enter the armed services and are below the rank of a commissioned officer are again entitled to retain their membership without payment of further dues. The arrangement is automatically terminated on the member's return to civilian life.

Westinghouse Engineer Calls Aviation Gas Turbine A Metallurgical Marvel

Reported by G. A. Stemple
Consolidated Gas, Electric Light & Power Co.

An insight into the metallurgical problems in the design and manufacture of aviation gas turbines was provided for Baltimore Chapter members on Nov. 20th by P. G. DeHuff, Jr., metallurgical section engineer, Westinghouse Electric Corp., Philadelphia.

The power plant of the jet plane is the gas turbine. The Westinghouse turbo-jet engine contains an axial-flow air compressor and a two-stage turbine. The air compressor consists of an unusually large aluminum alloy forging (14S) with 12% chromium steel blades housed in magnesium castings. The turbine itself has cast stellite blades. The turbine housing uses 25-20 Cr-Ni stainless steel, and the tail cone is made of stabilized 18-8 stainless steel.

These combinations of metals give rise to problems of creep, galvanic corrosion, differential expansion and assembly, which are second only to the main factor of strength-weight ratio in material selection. Actually it is the temperature-time-strength-weight relationship that is important, for the blading of the turbine may be designed for perhaps 500 hr. life at an operating temperature of 1400 to 1600° F.

Because the margin of safety may be only 50° F, every part of the turbine is subjected to repeated inspection. Turbine blades, for example, receive two X-ray and three Zyglo examinations.

At the conclusion of his talk, Mr. DeHuff showed two motion pictures of McDonnell twin-jet aircraft.

The coffee speaker, Lynn Poole of Johns Hopkins University, explained the staging of science television shows.

A Suggestion to Metals Review Readers:

The center section of this special issue of Metals Review *carries a newly inaugurated Junior Member Placement Service. In this section appear photographs and qualifications of nearly 300 graduating metallurgists who will be available to industry between now and next summer.*

In these days of manpower shortages, you could do your company a big favor by passing this special section on to the employment or personnel manager, with a note calling his attention to the explanatory introduction on page 1-A immediately following page 24.

THE EDITOR

Radiant Heating Speeds Production

Speakers' Table at a Recent Meeting in St. Louis Included (Left to Right): Vernon Pulsifer of Western Cartridge Co., Program Chairman; James Kniveton of Selas Corp. of America, the Speaker; and Carl Messinger of Allegheny Ludlum Steel Corp., St. Louis Chapter Chairman

Reported by H. O. Nordquist
Manager, Alloy & Stainless Steel Dept. Joseph T. Ryerson & Son, Inc.

With the high-speed radiant heating method described before the St. Louis Chapter A.S.M., hardness variations as low as three points can be regularly obtained in the continuous annealing of steel strip. The method was explained by James Kniveton, vice-president of the Selas Corp. of America, before a recent meeting of the chapter.

Batch-type heating, on the other hand, is difficult to control with a hardness variation of anything less than ten points, he said. Discoloration of the edges of coils, peculiar to batch-type heating, is eliminated by radiant heating, which produces a uniform finish and does not necessitate selective use of the coil in its specific application. Radiant heating makes possible high-speed in-line processing; the time consumed is considerably less than that sometimes required in batch heat treating operations.

Much better physical properties are obtained from the continuous radiant type of heating as compared to conventional methods. The high rate of heating improves physical properties by increasing the hardness without hurting the ductility.

Several of the advantages in favor of radiant heat processing equipment are saving of equipment space; better heat coverage of larger areas at faster rates with better physical properties; and production of a light, loose scale.

Atlantic Steel Co. Expands

The Atlantic Steel Co., Atlanta, Ga., is launching a three-year expansion program that will increase its steelmaking capacity 50% and double its output of rolled products, it has been announced by Robert S. Lynch, president of the company.

First phase of the program will be the installation of a 60-ton electric furnace at a cost of approximately $1,500,000. It is estimated that the new furnace will produce a minimum of 100,000 tons of steel annually. Second phase of the expansion program, to begin when the new furnace is completed, will be the addition of a new rolling mill.

Registration Opens for Detroit Lecture Course

Reported by H. E. Hostetter
Climax Molybdenum Co. of Michigan

Detroit Chapter A.S.M. will present a series of three educational lectures on March 26, March 29 and April 2 on the general subject, "Fundamentals of the Heat Treatment of Steel". The background for the course will be that classic of the A.S.M. library, "Principles of Heat Treatment", by Marcus A. Grossmann. The lectures are to be given at the Rackham Memorial Building, Detroit, by Clarence A. Siebert, professor of metallurgical engineering, University of Michigan.

Registration for the course will be open early in March to both members and nonmembers of A.S.M. for a fee of $3.50. Each registrant will receive a copy of Dr. Grossmann's book prior to the first lecture, and those attending all three lectures will be presented with A.S.M. certificates.

Because the regular price of the book alone is $4.50, it can be appreciated that the Detroit Chapter Educational Committee, under the cochairmanship of R. M. McBride and T. E. Olson, is genuinely concerned about their ability to accommodate all who wish to enroll. Since the facilities available at the Rackham Building are sufficient for only 150 people, registration will be limited to that number on a first-come, first-served basis.

Five New Grades of Stainless Steel Are of Two Types

Reported by W. Mack Crook
Consulting Engineer (Houston)
and Arthur C. Willis
Instructor, Southern Methodist Univ. (Dallas)

Five new grades of stainless steel have been developed and produced commercially by the Armco Steel Corp. within the past five years, according to John J. Halbig, corrosion engineer for Armco. These new steels were described by Mr. Halbig before both the North Texas and Texas Chapters of A.S.M. in Dallas and Houston on Dec. 4 and 5 respectively. Both meetings were held jointly with the local chapters of the National Association of Corrosion Engineers.

The five new steels include two precipitation-hardening alloys (17-4 PH and 17-7 PH), and three extra-low-carbon austenitic stainless steels (Types 304 ELC, 316 ELC, and 317 ELC).

The precipitation hardening alloys are heat treatable chromium-nickel stainless steels that offer definite advantages over the regular hardenable chromium grades. Their corrosion resistance is superior to that of the regular chromium grades and approaches that of 18-8.

The 17-4 PH alloy was developed primarily for forging billet, bar, large size wire, and casting applications. Its outstanding properties are brought out by a relatively low-temperature (850 to 900° F.), short-time heat treatment. The 17-7 PH alloy was developed primarily for sheet, strip, plate, and wire applications. Its high strength and hardness are brought out by double heat treatment, or by cold working and a single relatively low-temperature heat treatment. In wire form, tensile strength approximately equivalent to that of carbon steel music wire can be obtained.

The extra-low-carbon stainless steels contain a maximum of 0.03% carbon. This value is low enough to prevent detrimental precipitation of carbides, or sensitization, in the parent metal on either side of welds. It is primarily for this purpose that the extra-low-carbon stainless steels have been produced and recommended. These grades are not designed for corrosive service in the 800 to 1600° sensitizing range. Metal-arc welding of the extra-low-carbon stainless steels may be done with a variety of recommended electrodes.

Alcoa Contemplates New Construction And Reactivation

Reported by George Sorkin
Metallurgist, U. S. Navy Bureau of Ships

Technological advances in the aluminum industry have sparked the demand for aluminum and its alloys. Postwar economical production capacity of 1½ billion pounds per year is four times the prewar figure. According to E. H. Dix, Jr., assistant director, Aluminum Research Laboratories, who addressed the Washington Chapter's December meeting, the attractiveness of aluminum can be attributed to four characteristics. These are light weight, high electrical and thermal conductivity, high resistance to corrosion and a pleasing appearance.

Although annual aluminum production capacity in World War II was 2¼ billion pounds, much of it was not economical for postwar operation. Accordingly, higher demands for aluminum brought about by the armament programs will necessitate construction of new facilities as well as reactivation of idle equipment. Aluminum Co. of America, in order to increase aluminum production 25% will, as a "quick action phase", operate standby facilities with higher cost power, and as a second phase, enlarge its newest plant at Point Comfort, Texas, and construct an entirely new plant. The power at Point Comfort is generated by internal combustion engines operating on natural gas.

Aluminum has come a long way since the cap of the Washington Monument was installed in 1884. Developments in casting processes, alloys, fabricating and joining techniques, and production methods have led aluminum to the place it now holds as second only to steel on a volume consumption basis in the United States.

Plating of aluminum has only recently emerged as a satisfactory process. The key to the procedure has been the limiting of the thickness of the thin film of zinc applied prior to the usual copper-nickel-chromium coating.

Aluminum alloy bearings have been developed for applications where solid bearings capable of heavy loads up to 5000 psi. and over are required. Two alloys are used. One containing 6.5% Sn, 1% Cu, and 1% Ni is satisfactory up to 230° F. For temperatures up to 300° F. this alloy is modified by changing copper to 2%, nickel to 1.2% and adding 0.8% Mg.

Aluminum and its alloys are now commonly joined by soldering, brazing and welding, and Dr. Dix mentioned several recent developments in this field.

One of the more attractive alloy groups is the aluminum-magnesium system. An experimental alloy containing about 3 to 4% Mg has been developed as a possible substitute in welded structures for the heat treated 61S alloy. It is being subjected to a wide testing program prior to introduction to general usage.

L. and N. Adds to Floor Space

Acquisition of approximately 85,000 sq. ft. of additional floor space by Leeds & Northrup Co., Philadelphia, has been announced by C. S. Redding, president of the firm. The new space will be used to increase production and also to improve delivery and other service facilities.

Speaks on Toolsteel Selection

Leaders at the December Meeting of Worcester Chapter A.S.M. Were (Left to Right): R. S. Morrow of George F. Blake, Inc., Chapter Chairman; Leroy M. Gippert of Allegheny Ludlum Steel Corp., Who Spoke on "Better Selection of Toolsteels", and H. J. Elmendorf of American Steel & Wire Co., Technical Chairman. Mr. Gippert first discussed the effect of varoius tempering temperatures on the size change of die steels. He then showed slides of typical toolsteel failures, explained the causes, and recommended corrective measures. (Reported by Lincoln G. Shaw)

Columbia Offers Scholarships

The School of Mines of Columbia University has announced the availability of several Henry Krumb Scholarships. The scholarships are awarded annually to worthwhile students working for their B.S., M.S. or E.M. degrees in mining, metallurgy and mineral engineering.

The recipient is provided with $1000 a year plus traveling expenses to New York (within the U. S.). The scholarships are granted on the basis of ability and not necessarily of need.

Application blanks and further information may be secured from the Office of University Admissions, Columbia University, New York 27, N. Y. Applications must be filed before April 1, 1951.

Titanium Offers Alloying Choices With Many Metals

Reported by F. J. Welchner
Metallurgist, Canton Drop Forging & Mfg. Co.

Lee S. Busch, assistant staff metallurgist, P. R. Mallory & Co., Inc., in a talk before the Canton-Massillon Chapter A.S.M. on Dec. 4, presented informative data on titanium.

Titanium can be alloyed with copper, chromium, boron, tungsten, aluminum, manganese, indium, iron, silicon, cobalt, vanadium and nickel, the speaker said, and presented slides showing the relative heat treatments and physical properties of these various alloys.

Since titanium ores are very plentiful, concentrated efforts toward the development of refining techniques to make this material commercially and economically available are in order, according to Mr. Busch. The physical properties of titanium are comparable to those of stainless steel, and its high-temperature properties are better than any aluminum or magnesium alloys.

Titanium alloys can be forged satisfactorily, and although drilling and tapping by ordinary practices have presented some difficulty, the machinability in general is comparable to that of 18-8 stainless steels.

Titanium alloys seem to be adaptable for application in aircraft, particularly jets and turbo-jets where corrosion resistance as well as light weight are important factors.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Mar. 14		W. O. Sweeney	Precision Casting and Carbides
Baltimore	Mar. 19	Engineers' Club	Henry Hessler	Marform
Boston	Mar. 2	Shelton Hotel	A. O. Schaefer	Testing and Inspection of Large Forgings
British Columbia	Mar. 8	Stanley Park Pavilion		Ladies Night
Calumet	Mar. 13	Phil Smidt's, Hammond	J. P. Skinner	Stones & Stars
Canton-Massillon	Mar. 12	Mergus Restaurant	Panel Meeting	Steelmaking
Chicago	Mar. 12	Furniture Club	W. R. Frazer	Mid-Century Trends in High Speed Steel
Cincinnati	Mar. 8	Engineering Society	Wm. T. Bean, Jr.	
Cleveland	Mar. 5	Tudor Arms Hotel	C. F. Prutton	Corrosion of Metals and Alloys
Columbus	Mar. 7	Broad St. Church of Christ	Claus G. Goetzel	Powder Metallurgy
Dayton	Mar. 14	Armco Steel Corp.		Plant Visitation
Detroit	Mar. 12	Rackham Bldg.	Max Kuniansky	Nodular Cast Iron
Fort Wayne	Mar. 12	Chamber of Commerce	E. O. Dixon	Forgings
Hartford	Mar. 13	The Hedges	John J. B. Rutherford	Continuous Billet Forging & Tubing
Kansas City	Mar. 21	Fred Harvey Pine Room		Ladies Night
Lehigh Valley	Mar. 2			Iron Ore Resources of the World
Los Alamos	Mar. 26	High School Audit.	John Chipman	
	Mar. 30	High School Audit.	Elmer Gammeter	Stainless Steels
Los Angeles	Mar. 16	Rodger Young Audit.	W. E. Jominy	Alloy Steels
Louisville	Mar. 6	Kapfhammer's Party House	Charles H. Moore	Titanium
Mahoning Valley	Mar. 13	Post Room, V.F.W.	T. E. Eagan	A New Engineering Material, Nodular Iron
Milwaukee	Mar. 20	City Club of Milwaukee	Harry K. Ihrig	Trends in Metallurgical Research
Montreal	Mar. 5	Spanish Room, Queen's Hotel	John R. Freeman, Jr.	New Developments in Copper Alloys
	Mar. 16	Mount Royal Hotel		Annual Stag Banquet
Muncie	Mar. 13	Delaware Hotel	W. O. Owen	Protective Atmospheres
New Haven	Mar. 15	Hotel Barnum, Bridgeport	Edward E. Hall	Quality Controls in the Manufacture of High-Grade Steel
New Jersey	Mar. 19	Essex House, Newark	A. B. Kinzel	Low-Iron Alloys
New York	Mar. 12	2 Park Ave.	W. E. Crafts	Heat Treatment of Steel
North Texas	Mar. 14	Dallas		
North West	Mar. 15	Covered Wagon	J. Welchner	Carburizing
Northwestern Pa.	Mar. 15	Corry, Pa.	H. W. McElhaney	Industrial Waste Disposal
Northern Ontario	Mar. 21	Windsor Hotel, Sault Ste. Marie	R. Hindson	Metallurgical Aspects of Steelmaking
Notre Dame	Mar. 15	Engineering Bldg., University of N. D.	W. H. Holcroft	Carbonitriding
Ontario	Mar. 2	King Edward Hotel, Toronto		Ladies Night
Ottawa Valley	Mar. 6	Mines Branch	Winnett Boyd	Jet Engine Development in Canada and its Associated Material Problems
Penn State	Mar. 13	217 Willard Hall	C. H. Sample	Corrosion and the Protective Value of Metallic Coatings
Peoria	Mar. 14		H. B. Osborn, Jr. and Milton Garvin	Induction vs. Flame Hardening
Philadelphia	Mar. 30	Franklin Institute	P. W. Bridgman	The Effect of High Stresses on the Mechanical Properties of Metals
Pittsburgh	Mar. 8	Roosevelt Hotel	Clark King	Young Fellows' Night
Puget Sound	Mar. 27		Walter E. Jominy	
Purdue	Mar. 30	Masonic Temple, Kokomo	J. H. Brennan	Romance of Metals
Rhode Island	Mar. 7		E. S. Bunn	Aluminum Alloys
Rochester	Mar. 12		A. L. Boegehold	Selection and Treatment of Metals for Automotive Applications
Rockford	Mar. 28	Faust Hotel	Waldemar Naujoks	Modern Forging Practice and Techniques
Saginaw Valley	Mar. 20	Frankenmuth, Mich.	R. P. Koehring	Powder Metallurgy
San Diego	Mar.	Chi Chi Restaurant	Walter E. Jominy	
Southern Tier.	Mar. 12	Hotel Frederick, Endicott, N. Y.	W. C. Wall	Engineering Applications of Nylon
St. Louis	Mar. 16		Harlan A. Wilhelm	Atomic Energy and Metallurgy
Springfield	Mar.	Hotel Sheraton	B. N. Ames	Plastic Bonded Shell Molding and Casting
Terre Haute	Mar. 5			Welding
Texas	Mar. 13	Ben Milam Hotel Houston	Walter E. Jominy	Alloy Steels From the Consumer's Standpoint
Toledo	Mar. 15	Maumee River Yacht Club	W. T. Bean and Anthony Satullo	Strain Measuring Equipment
Tri-City	Mar. 13	Rock Island Arsenal Cafeteria	Harold Bogart	Nodular Cast Iron

Tulsa	Mar. 12		Harold Y. Hunsicker	Applications of Aluminum Alloys
Utah	Mar. 29	Aviation Club	J. B. Austin	Magnification in Time
Warren	Mar. 8		Waldemar Naujoks	Fundamentals of Forging Practice
Washington	Mar. 12	Garden House, Dodge Hotel	V. N. Krivobok	Current Developments in Stainless Steel
West Michigan	Mar. 19	Morton House, Grand Rapids	D. L. Colwell	Aluminum as an Engineering Material
Worcester	Mar. 14		Frank E. Kessler	Tool and Die Salvage by Welding
York	Mar. 14	Lancaster	F. E. Dreves	Cold Finished Steel

IMPORTANT MEETINGS
for March

March 5-7—Pittsburgh Conference on Analytical Chemistry and Applied Chemistry, William Penn Hotel, Pittsburgh. Sponsored jointly by Spectroscopy Society of Pittsburgh and Analytical Chemistry Group, Pittsburgh Section, American Chemical Society. (James F. Miller, publicity committee, c/o Mellon Institute, 4400 Fifth Ave., Pittsburgh 13, Pa.)

March 5-9—American Society for Testing Materials. Spring Meeting and Committee Week, Netherland-Plaza Hotel, Cincinnati, Ohio. (Robert J. Painter, assistant secretary, A.S.T.M., 1916 Race St., Philadelphia 3, Pa.)

March 6-8—Society of Automotive Engineers. Passenger Car, Body and Materials Meeting, Hotel Book-Cadillac, Detroit. (John A. C. Warner, secretary and general manager, S.A.E., 29 West 39th St., New York 18, N. Y.

March 11-14—American Institute of Chemical Engineers. Regional Meeting, The Greenbrier, White Sulphur Springs, Va. (S. L. Tyler, executive secretary, A.I.Ch.E., 120 East 41st St., New York 17, N. Y.)

March 13-16—National Association of Corrosion Engineers. 1951 General Conference and Exhibition, Hotel Statler, New York City. (A. B. Campbell, executive secretary, N.A.C.E., 919 Milam Bldg., Houston 2, Texas.)

March 14-17—American Society of Tool Engineers. Annual Meeting, Hotel New Yorker, New York City. (Harry E. Conrad, executive secretary, A.S.T.E., 10700 Puritan Ave., Detroit 21.)

March 19-21—Steel Founders Society of America. Annual Meeting, Edgewater Beach Hotel, Chicago. (F. Kermit Donaldson, executive vice-president, S.F.S.A., 920 Midland Bldg., Cleveland 15.)

March 21-22—American Hot Dip Galvanizers Association, Inc. 1951 Annual Meeting, Hotel Biltmore, Atlanta, Ga. (Stuart J. Swensson, secretary-treasurer, A.H.D.G.A., 2311 First National Bank Bldg., Pittsburgh 22, Pa.)

March 22-23 — Pressed Metal Institute. Annual Technical Meeting, Hotel Carter, Cleveland. (Jerry Singleton, 13210 Shaker Square, Cleveland 20.)

March 28-29—Instrument Society of America, Pittsburgh Section, jointly with **Carnegie Institute of Technology.** Conference on Instrumentation for the Iron and Steel Industry, Pittsburgh. (L. M. Susany, general chairman, c/o Carnegie Library, 4400 Forbes St., Pittsburgh 13, Pa.)

Cornell Starts Lab Building

A $1,700,000 laboratory for the study of materials and methods of processing them will become the second unit in Cornell University's new engineering development program.

A building contract has been awarded, and construction will begin as soon as conditions permit. The center is scheduled for completion sometime in 1952.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor
Assisted by Pauline Beinbrech, N. W. Baklanoff, Fred Rothfuss, and Leila M. Virtue

A GENERAL METALLURGICAL

1-A. Steel for Western Needs. John R. Zadra. *Mines Magazine,* v. 40, Dec. 1950, p. 15-18.
Surveys developments of past 50 years in the iron and steel industry of the western U. S. (A4, Fe, ST)

2-A. Metalworking Research Reaches All-Time High: Armour Research Foundation. Robert A. Lubker. *Iron Age,* v. 166, Dec. 21, 1950, p. 74-77.
Fifth of a series. Facilities and metallurgical research programs at Armour. (A9)

3-A. The Supply of Nonferrous Metals. C. Donald Dallas. *Metal Progress,* v. 58, Dec. 1950, p. 839-841.
See abstract of "Important Facts About Our Supplies of Non-Ferrous Metals," *Automotive Industries,* item 309-A, 1950. (A4, Cu, Zn, Al, Pb)

4-A. Notes on Russian Metallurgy. N. H. Polakowski. *Metal Progress,* v. 58, Dec. 1950, p. 866-867.
Former resident of Poland and Russia explains "disappearance" of several Russian journals. How a new openhearth design worked out on paper was adopted on a large scale without sufficient experimentation and resulting trouble and expense. Other deficiencies of Russian metallurgy. (A general)

5-A. The Economics of Raw Material Supplies in the Birmingham District. E. C. Wright. *Mining Engineering,* v. 187, Dec. 1950, p. 1214-1220.
Refers to the iron and steel industry. Trends in procurement and cost for the major steel-producing districts. Results of a 3-yr. survey conducted for the Bureau of Business Research of the University of Alabama. (A4, Fe, ST)

6-A. U. S. Produces Almost Half of World's Steel. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 72-73.
A graphical and tabular presentation. (A4, ST)

7-A. Republic Starts Major Expansion in Cleveland District. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 136, 138.
Plans which will add 672,000 net tons of steel ingot capacity per year to Republic's Cleveland plant. (A4, ST)

8-A. Waste Utilization and Disposal Systems; Cost Studies of Evaporation and Drying. W. D. Kohlins and E. L. Demarest. *Chemical Engineering Progress* (Engineering Section), v. 46, Dec. 1950, p. 597-600.
How to make cost studies for five typical examples: fermentation waste liquor, liquor from rag-cooking operations, fishing-industry applications, metal treating plants; and whey recovery. (A8)

9-A. Questions Advisability of Accelerating Metal Stockpiling Program at This Time. C. Donald Dallas. *Metals,* v. 21, Nov. 1950, p. 7-9.
Believes current shortages are due to excessive demand from industry and government; imposition of copper duty is believed to be poor statesmanship. (A4, Cu)

10-A. World Production of Primary Aluminum in 1951 Is Estimated at 1,445,000 Metric Tons. R. L. Wilcox. *Metals,* v. 21, Nov. 1950, p. 10-12.
U. S. government's combined stockpiling and defense requirements are placed at 220,000 tons for 1950; 65,000-ton world shortage is seen. (A4, Al)

11-A. Removal of Zinc From Zinc-Plated Iron and Steel Scrap. (In German.) Edmund R. Thews and Martin Strohmeyer. *Metalloberfläche,* sec. A, v. 4, Nov. 1950, p. 169-172.
General procedures and comparative effects of acid, alkali, and galvanic processes. Importance of first removing any fatty or oily material. A8, Fe, ST, Zn)

12-A. Rubber Goods: What Metalworking Needs and Will Get. Oliver L. Johnson. *Iron Age,* v. 166, Dec. 28, 1950, p. 57-59.
An economic survey. (A4)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

13-A. Sees More Stringent Controls Over Metals to Meet Stockpiling and Defense Needs. Joseph Zimmerman. *Metals,* v. 21, Dec. 1950, p. 7-10.
Economic analysis and forecast. Suggests metal stockpiling be suspended to ease shortages. (A4)

14-A. $120 Billion Metalworking Market Ahead. *Steel,* v. 128, Jan. 1, 1951, p. 85-100.
An economic analysis and forecast. (A4)

15-A. Facts and Figures on Metalworking. *Steel,* v. 128, Jan. 1, 1951, p. 117-148.
Statistics on production and capacity, distribution, shipments, prices, consumption, business indexes, trade, employment and wages for ferrous and nonferrous metals and finished products. (A4, A5)

16-A. 1951 Technical Forum on Progress in Metalworking. *Steel,* v. 128, Jan. 1, 1951, p. 158-164, 166, 168, 170, 174, 177, 180, 185, 188, 190, 193-194, 197, 200, 203, 206, 209, 211, 214, 216, 219, 222, 224, 227, 230, 233-234, 237, 241-242, 244, 247-248, 250, 253-254, 257, 260, 262, 264, 267-268, 271, 275-276.
173 experts briefly summarize what they believe to be the most important technical milestones in metallurgy; heat treating; metal production; casting; forging and forming; machining; surface treatment; joining and welding; materials handling; processing equipment; and lubrication. (A general)

17-A. Metallurgy Geared for All-Out Production. David C. Minton, Jr. *Chemical and Engineering News,* v. 29, Jan. 1, 1951, p. 33-34.
Reviews recent economic and technical developments. (A4)

18-A. Metalworking Meetings Scheduled for 1951. *Iron Age,* v. 167, Jan. 4, 1951, p. 114, 117-118, 120, 122-123.
Lists technical meetings, conventions and expositions on various phases of metalworking and metal production in chronological order. (A10)

19-A. National Trade Associations and Technical Societies. *Iron Age,* v. 167, Jan. 4, 1951, p. 150, 152, 154, 156, 158, 160, 162.
Lists some 200 professional and technical societies and trade associations in metalworking and metal production. Includes addresses and names of individuals in charge of operation of the organizations. (A10)

20-A. Technical Progress. The Horizon Broadens. *Iron Age,* v. 167, Jan. 4, 1951, p. 272-275.
Annual review of metalworking progress. (A general)

21-A. The Iron Age Metal Industry Facts, 1951. *Iron Age,* v. 167, Jan. 4, 1951, p. 279-374.
Annual statistical section covers steel production, prices, and markets; nonferrous production, prices and markets; raw materials, ore, scrap, coal, and coke; metal products—automotive and railroad, casting, forging, and powder metallurgy; machine tools and welding; market and product-research data; labor and safety; government controls; and military buying. (A4)

22-A. Alcoa Today; Vast Growth Underway for War or Peace. W. B. Griffin. *Modern Metals,* v. 6, Dec. 1950, p. 22-25, 28-29, 31, 33-34.
Development and present status of Aluminum Co. of America. Emphasizes role played by I. W. Wilson, Alcoa's senior vice-president. (A4, Al)

23-A. Panel Discussion of the Lead Production Outlook. *Lead Industries Association,* "Proceedings of the Twenty-First Annual Meeting," Apr. 1949, p. 7-28.
Outlooks for different regions as follows: "Northwest", J. B. Haffner;

"Utah and the Southwest", F. A. Wardlaw, Jr.; "Midwest and East", Francis Cameron; and "Foreign", R. F. Goodwin. Also includes "Secondary Lead", by Marc S. Goldsmith. Discussions are included. (A4, Pb)

24-A. Lead and the Defense Program. R. B. McCormick. *Lead Industries Association,* "Proceedings of the Twenty-First Annual Meeting," Apr. 1949, p. 29-37; disc., p. 34-37.

The duties of the Munitions Board. Its program in relation to lead for industrial use and government stockpiling. (A4, Pb)

25-A. Panel Discussion of the Outlook for Some Important Lead Products. *Lead Industries Association,* "Proceedings of the Twenty-First Annual Meeting," Apr. 1949, p. 38-69.

Outlooks for the following products: "Lead-Covered Cable", R. K. Spofford; "Tetraethyl Lead", J. H. Schaefer; "Extruded and Rolled Lead Products", Walter P. Carroll; "Lead Oxides", Miles M. Zoller; "Lead Paints", A. R. Knight; "Mixed Metals", Aubrey M. Callis; "Storage Batteries", H. A. Harvey. Discussions are included. (A4, Pb)

26-A. Guide for Steel Buyers. *Steel,* v. 128, Jan. 15, 1951, p. 37-80.

Each product is listed together with sizes available, where produced, and a simple code for identifying each company. (A4, ST)

27-A. Industrial Hygiene At American Smelting and Refining Company. John N. Abersold and K. W. Nelson. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 33-36.

Work of special hygiene laboratory and some of the equipment and procedures which have been adopted for use in connection with specific operations in the smelting and refining of various nonferrous metals. (A7, C general, EG-a)

28-A. America Needs More Aluminum. John Alico. *Light Metal Age,* v. 8, Dec. 1950, p. 8-10, 24-25.

The present situation and suggests methods for increasing production. (A4, Al)

29-A. Designing for Military Requirements. *Product Engineering,* v. 22, Jan. 1951, p. 85-100.

Special section covers military specifications, their origin and development; design trends; government research and how to get it; a military directory showing who buys what; and an outline of the defense organization. (A5, T2)

30-A. New England as a Possible Location for an Integrated Iron and Steel Works. Walter Isard and John H. Cumberland. *Economic Geography,* v. 26, Oct. 1950, p. 245-259. (Reprint.)

An economic analysis. 29 ref. (A4)

31-A. Treatment and Disposal of Cyanide-Bearing Wastes. John E. Tarman and Max U. Priester. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 40-52. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Specific problems, treatment systems, facilities, and results at four different plants. (A8)

32-A. Treatment of Acid, Cyanide, and Chromium Wastes. C. F. Waite. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 223-231. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Problems and treatment procedures at the King-Seeley Plant at Scio, Mich. (A8, Cr)

33-A. Peculiar Characteristics of Chromium. Don E. Bloodgood and Aubrey Strickland. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 232-242. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Investigations at Purdue University for using commercial ion-exchange resins in producing Cr-free water and recovery of valuable Cr compounds from dilute waste waters. 11 ref. (A8, Cr)

34-A. Disposal of Waste Pickling Liquors. Thomas F. Reed. *Proceedings of the Fifth Industrial Waste Conference,* Nov. 29-30, 1949, p. 286-295. (*Purdue University, Engineering Bulletin,* v. 34, Extension Series No. 72, July 1950.)

Reviews available processes and their lack of suitability in solving the disposal problem. Defines the problem, emphasizing sulfuric acid pickle liquor wastes resulting from the removal of surface oxides from steel. (A8, ST)

35-A. (Book) **Standard Metal Directory.** Joseph Zimmerman, editor. 1950 Ed. 818 pages. Atlas Publishing Co., Inc., 425 West 25th St., New York 1, N. Y. $15.

Completely revised. Five sections embracing iron and steel plants, ferrous and nonferrous metal foundries, rolling mills, steel rolling mills, smelters and refiners. Plants are listed geographically and alphabetically. Includes many special lists. (A4)

36-A. (Book) **Institute of Scrap Iron & Steel Yearbook.** 122 pages. 1950. The Institute, 1536 Connecticut Ave., Washington 6, D. C.

(A4, A8, Fe, ST)

37-A. (Book) **Proceedings of the Twenty-First Annual Meeting, Lead Industries Association.** 69 pages. 1949. The Association, 420 Lexington Ave., New York 17, N. Y. $2.00.

Covers meeting held in Chicago Apr. 8-9, 1949. Includes an opening address, two panel discussions, and a paper. Covers production outlook, outlook for some lead products, and the relation of lead to the defense program. The panel discussions and the paper are abstracted separately. (A4, Pb)

38-A. (Book) **National Physical Laboratory Reports for the Year 1948 and 1949.** His Majesty's Stationery Office, 1950. 64 and 68 pages, respectively.

Reports work of the Aerodynamics, Electricity, Engineering, Light, Mathematics, Metallurgy, Metrology, Physics, Radio, Electronics, and Ship divisions. (A9)

39-A. (Book) **Metal Industry Handbook & Directory.** 468 pages. 1950. Louis Cassier Co., Dorset House, Stamford St., London S.E.1, England.

Includes additions to tables covering thermal expansion and specific resistance, and to official British specifications for nonferrous alloys. New tables cover the weights of cold drawn Ni and Ni-alloy tubes. (A4, S22, EG-a)

40-A. (Book) **Iron & Steel Directory and Handbook.** Ed. 6. 302 pages. 1950. Louis Cassier Co., Ltd., Dorset House, Stamford St., London S.E.1, England.

The directory section includes lists of British pig-iron manufacturers, iron founders, steel works, steel founders. Iron and steel trade associations and iron, steel, and engineering scientific and technical societies and institutions are listed with addresses. The handbook section contains a large amount of technical data for engineers, metallurgists, and iron and steel makers and users (A4, Fe, ST)

41-A. (Book) **Hierro y Acero** (Enciclopedia Siderurgica). (Iron and Steel Encyclopedia.) Hugh P. Tiemann. 1950. 782 pages. Translated and published by the Instituto del Hierro y del Acero, 1st Ed. Madrid, Spain, 75 Ptas.

Translation of the latest edition (1933) of Tiemann's pocket encyclopedia fills a gap in converting terms from one language to the other. The alphabetical order of the words and terms collected, defined and explained by Tiemann is followed with the Spanish equivalent, explanation and proper cross reference. Includes list of Spanish terms found in the text and the equivalent English ones, which enhances the value of the book to the reader and translator. The Spanish Iron and Steel Institute has rendered a decided service to both Spanish-speaking and English-speaking metallurgists. —F.R.M. (A10)

B

RAW MATERIALS AND ORE PREPARATION

1-B. Post-War Rehabilitation and Mechanization of a Philippine Chromite Mine. A. P. Davidson. *Mines Magazine,* v. 40, Dec. 1950, p. 19-24.

Includes flowsheet and description of beneficiation practice. (B14, Cr)

2-B. Bureau of Mines Studies Iron Ore Concentration—Gravity-Flotation Combination Appears Best. Ballard H. Clemmons. *Mining Engineering,* v. 187, Dec. 1950, p. 1221-1224.

Methods for concentration of poorer grade iron ores found in the Birmingham area. 20 ref. (B14, Fe)

3-B. Heavy-Media Separation Increases Brown Ore Reserves. *Mining Engineering,* v. 187, Dec. 1950, p. 1236-1237.

Equipment and procedures for mining and beneficiation of brown iron ore at the Blackburn mine of Shook & Fletcher Supply Co. about 120 miles northwest of Birmingham. (B14, B12, Fe)

4-B. The Probability Theory of Wet Ball Milling and Its Application. Elliott J. Roberts. *Mining Engineering,* v. 187, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1267-1272.

The theory is developed that the tons ground through a given mesh per day in a wet ball mill are proportional to the per cent plus that mesh in contact with the balls and the net power applied to the balls at this point. A grindability test and typical data. (B13)

5-B. Effects of Rod Mill Feed Size Reduction. John J. Strohl and Henry J. Schwellenbach. *Mining Engineering,* v. 187, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1273-1274.

Results obtained by decreasing the size of feed to a rod mill screen circuit. Added production was gained and a finer grind with no tonnage loss was made possible. (B13)

6-B. Laboratory Studies on Iron Oro Sintering and Testing. F. M. Hamilton and H. F. Ameen. *Mining Engineering,* v. 187, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1275-1282.

Results of a laboratory investigation of some sintering variables. Effect on physical properties of mix-component variation and rate of cooling of the sinter is illustrated by crush and tumbler test results. Results of reducibility tests, of microscopic examination of sinters,

and of using solid additions in the mix to improve bed permeability. 14 ref. (B16, Fe)

7-B. Quebec Zinc Concentrates: Mineralization—Impurities—Amenability to Electrolytic Process. B. J. Walsh. *Canadian Mining Journal,* v. 71, Dec. 1950, p. 47-54.

Magnetic fractionation was utilized to determine the proportion of sphalerite occurring as ordinary sphalerite, marmatite, or christophite in several Zn concentrates produced in the Province of Quebec. (B14, C23, Zn)

8-B. Chromium-Silicon Alloys in the Manufacture of Stainless Steels; A New Technique of Slag Reduction Developed in Sheffield. D. J. O. Brandt and W. H. Everhard. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 167-170.

Use of an alloy of Fe, Si, and Cr instead of the usual 75% ferrosilicon. Comparative data for both types. (B22, D5, SS, Fe-n)

9-B. Recent Plant Results With the Lime Sintering Process. (In German.) Herbert Boos. *Stahl und Eisen,* v. 70, Nov. 23, 1950, p. 1108-1111.

Difficulties of transporting burnt lime for sintering of iron ores were successfully met by burning the limestone directly in the sintering zone. Granular limestone was mixed with iron ore and other ingredients. (B16, Fe)

10-B. Fundamental Studies on Interfacial Tensions in Flotation. I. Determination of Surface Tension With Data on Aqueous Solutions of Frothers. (In English.) Masayoshi Wada. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 121-131.

Determination of surface tension by the ring method and some improvements in apparatus. Existing equations for the relation between surface tension and concentration are analyzed. Data on aqueous solutions of pure surface-active agents and on commercial frothers are tabulated. 36 ref. (B14, P10)

11-B. Fundamental Studies on Dissolution of Gold in Cyanide Solutions. I. Relation between Size of Gold Particle and Time of Dissolution. (In English.) Mitsuo Kameda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 133-138.

Time of dissolution calculated theoretically is compared with that obtained in cyanidation plants. (B14, Au)

12-B. Crushing in a Ball Mill (In Japanese.) M. Yoskida. *Journal of Mechanical Laboratory,* v. 4, Jan. 1950, p. 28-33.

Effects of various factors on efficiency of the process. (B13)

13-B. Studies on the Sulphuric Acid Process for Obtaining Pure Alumina From Its Ores. (In English.) K. Funaki. *Bulletin of the Tokyo Institute of Technology,* ser. B, no. 1, 1950, 165 pages.

Development of a new process in which Al silicate, natural alunite, or coal ash are heated with concentrated H_2SO_4 to dissolve the alumina. Several difficulties associated with both this step and with the separation of pure $Al_2(SO_4)_3$ have previously prevented the process from being commercialized. The author claims to have eliminated these difficulties by several modifications of the basic process. Typical results. (B14, Al)

14-B. Beneficiation of Taconites by Pyro-Metallurgy. Rudolph G. Wuerker. *Mining Engineering,* v. 190, Jan. 1951, p. 25-26.

Method and equipment for the Krupp-Renn process. Iron ore and coal, crushed to ⅜ in., are mixed and charged continuously to a revolving kiln. By passage through three temperature zones and by screening, grinding, and magnetic separation, pure nodules containing 90-97% Fe, a concentrate containing 65% Fe, and a slag containing 3% Fe are obtained. The concentrate is returned to the kiln. The nodules are charged directly to cupolas, blast furnaces, or even open-hearths. (B14, Fe)

15-B. Radiotracer Studies on the Interaction of Dithiophosphate with Galena; The Depressant Action of Phosphate. G. L. Simard, M. Burke, and D. J. Salley. *Mining Engineering,* v. 190, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1950, p. 39-44.

The depression of dithiophosphate by phosphate was investigated by correlating radiotagging measurements of competition in sorption with measurements of flotation. Competition in sorption was as complex as the sorption of the individual ions, thus strengthening the conclusion that more than one process is involved in the interaction of the ions with galena. (B14, S19, Pb)

16-B. Flotation Tests on Korean Scheelite Ore. Will Mitchell, C. L. Sollenberger, and T. G. Kirkland. *Mining Engineering,* v. 190, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1950, p. 60-64.

Beneficiation of a scheelite ore by flotation was investigated with emphasis on determining optimum conditions for obtaining maximum grade and recovery in the rougher concentrates. Variables such as pH, time, temperature, and pulp density during conditioning were plotted against grade and recovery of the rougher concentrates. Several gangue regulators, and several methods of cleaning rougher concentrates. 10 ref. (B14, W)

17-B. Experiments on Forsterite Linings Reported Successful. B. M. Pearson. *Iron Age,* v. 167, Jan. 18, 1951, p. 65-67.

According to recent German literature, good results have been achieved with Forsterite linings in induction furnaces. The raw material, Norwegian olivines, is plentiful, hence this practice may find wider use. (B19)

18-B. Steel Mill Fuels. O. P. Adams. *Industrial Heating,* v. 17, Dec. 1950, p. 2152, 2154, 2156, 2158, 2242.

Constituents and properties as well as problems encountered in use of the various fuels utilized by steel plants. (B18, ST)

19-B. An Accurate Density Meter—How It Works, How It Is Used. C. M. Marquardt. *Engineering and Mining Journal,* v. 152, Jan. 1951, p. 78-82.

Automatic, continuous, pulp-density meter developed for controlling density of solid-liquid suspensions in ore-beneficiation plants. (B14)

20-B. Simple Flowsheet, High-Capacity Units Make for Low-Cost Lead-Zinc Output in New Reeves-MacDonald Mill. John B. Huttl. *Engineering and Mining Journal,* v. 152, Jan. 1951, p. 84-85.

The mill of Pend-Oreille Mines & Metals Co., in British Columbia. (B13, B14, Pb, Zn)

21-B. Trout Rebuilds Manganese Mill. *Mining World,* v. 13, Jan. 1951, p. 33-35, 59.

Wet-milling plant for MnO_2 ore, which was rebuilt following a fire. Capacity was increased to 75 tons per day. It is located at Philipsburg, Montana, and is owned by Trout Mining Div., American Machine & Metals, Inc. (B13, Mn)

22-B. Size Reduction. Lincoln T. Work. *Industrial and Engineering Chemistry,* v. 43, Jan. 1951, p. 114-116.

Reviews literature of past year. 68 ref. (B13)

23-B. (Book) **Iron Blast-Furnace Slag Production, Processing, Properties, and Uses.** G. W. Josephson, F. Sillers, Jr., and D. G. Runner. 304 pages. 1949. U. S. Bureau of Mines, Superintendent of Documents, Washington 25, D. C. (Bulletin 479).

History and development. Includes sections on chemical and mineralogical composition, use as aggregate for portland-cement concrete and for flexible-pavement bases and surfaces, chemical and ceramic uses, railroad ballast, roofing, and other uses. 554 ref. (B21, D1, T general)

C — NONFERROUS EXTRACTION AND REFINING

1-C. A Method for the Preparation of High-Purity Indium Metal. T. A. A. Quarm. *Bulletin of the Institution of Mining and Metallurgy,* Dec. 1950, *Transactions,* v. 60, pt. 3, 1950-51, p. 77-80.

Indium, containing Tl, Cd, Pb, Sn, Cu, and Ag, was given two treatments with $SnCl_2$-NH_4Cl slag. Tl dissolves first and is discarded; Cd and most of the In dissolve in the second slag, leaving other impurities in the residue. The slag decomposes in water with the precipitation of finely divided In metal; the Cd and some In remain in solution. The pulp is acidified to coagulate the metal particles and to dissolve any products of hydrolysis. Before melting, the sponge is electrolyzed to clean and compact the metal. Purity of the In is 99.999%. (C4, In)

2-C. Multiple Casting; Continuous Production of Billets and Bars. W. Helling and F. Gassner. *Metal Industry,* v. 77, Nov. 24, 1950, p. 215-217; Dec. 1, 1950, p. 243-245; Dec. 8, 1950, p. 262-265. Translated from *Metall.*

Previously abstracted from original under similar title. See item 30-C, 1950. (C5, Al)

3-C. An Economic Method for Development of a New Technique; Development of Amalgam Chemistry. (In German.) E. Kuss. *Angewandte Chemie,* v. 62, Nov. 21, 1950, p. 519-526.

Shows that neither the Tainton nor the New Jersey processes are economical methods of processing chloride-containing zinc solutions. The amalgam process for producing Zn white and metallic Zn can be economically applied to a variety of other processes. Among these are: separation of Bi and Pb; refining of Tl by preparation of a Cd-Tl amalgam, followed by distillation; powdered-metal recovery; production of special irons having desired magnetic properties or for use as catalysts; Mn production; decomposition of solid amalgams and preparation of alloys, for example, Cu-Mn alloys; treatment of Zn scrap; and treatment of complex ores without flotation. (C29, H10)

4-C. The Ruthenburg Process for Precious Metal Recovery. C. C. Downie. *Mining Journal,* v. 235, Dec. 15, 1950, p. 587-588.

Ruthenburg process has been known for a long time, but has received little attention. It was originally introduced for reducing low-melting-point metals from alkali fusions by means of carbon. How it has been modified for successful application to precious metals. (C21, EG-c)

5-C. Smelting of a Scheelite Concentrate Containing Sulfur Using Sawdust as Fuel. (In Portuguese). Tharcisio D. de Souza Santos and Carlos Dias Brosch. *Boletim da Associacao Brasileira de Metais,* v. 6, July 1950, p. 232-240.

Results of laboratory experiments on production of ferrotungsten from scheelite containing up to 3.78% S in the form of sulfur. (C21, W, Fe-n)

6-C. Description of Electrolytic Refining of Silver Furnished by National Lead Refineries. (In Portuguese.) Tharcisio D. de Souza Santos, Ivo Jordan, and Venancio Ferreira Alves. *Boletim da Associacao Brasileira de Metais,* v. 6, July 1950, p. 273-289.

Process using cells of the Moebius type. This silver was obtained as a byproduct of lead refining from Pb-Ag ores of the Sao Paulo region. Conditions of refining and results. (C23, Ag)

7-C. Desilverization of Lead Bullion —Literature Report No. 13. P. I. A. Narayanan and M. C. Sen. *Journal of Scientific & Industrial Research,* v. 9A, Nov. 1950, p. 408-411.

Various methods. Concludes that the Parkes process is simplest, but that before addition of Zn, the furnace Pb must be thoroughly softened by removal of impurities like Fe, Cu, Sb, etc. (C21, Pb, Ag)

8-C. Extraction of Germanium from Sphalerite Collected from Nepal. Part II. R. K. Dutta and S. N. Bose. *Journal of Scientific & Industrial Research,* v. 9B, Nov. 1950, p. 271-272.

Chemical method for extraction of Ge from the non-magnetic fraction of sphalerite. (C general, Ge)

9-C. Minerals From the Sea. C. M. Shigley. *Journal of Metals,* v. 191, Jan. 1951, p. 25-29.

Development of processes for recovery of various minerals, from common salt to Br and Mg recovery. Considerable detail concerning procedures and equipment for the last two. (C22, C23, Mg)

10-C. Contribution to the Metallurgy of Chromium. W. J. Kroll, W. F. Hergert, and W. R. Carmody. *U. S. Bureau of Mines,* Report of Investigations 4752, Dec. 1950, 19 pages.

Investigation undertaken to study a number of unconventional methods for making Cr to determine whether production cost could be lowered. More recent processes include carbon reduction of the oxide in vacuum, nitride dissociation, fusion electrolysis of the chloride, amalgam method, iodide dissociation, Ca reduction of the oxide, H_2 reduction of the chloride, and reduction of this compound with Zn and with Mg. Methods are compared. 42 ref. (C general, Cr)

11-C. Production of Thallium in the Zinc Smelter at Magdeburg. (In German.) Walter Langner and August Göbel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Nov. 1950, p. 370-374.

A new method for extracting highly pure Tl from zinc blende. Protective measures against Tl poisoning. A rapid volumetric method for determining the Tl content of the extract. Flow charts and a schematic diagram. (C21, S11, Tl, Zn)

12-C. (Book) Die Verhüttung von Aluminiumschrott. (The Smelting of Aluminum Scrap.) Kurt Schneider. 202 pages. 1950. Metall-Verlag G.m.b.H., Berlin W.15, Germany. 12.50 DM.

First of a series of monographs on subjects of wide general interest to be edited by M. H. Haas. Begins with some statistical information. Chapters follow on preparation and sorting of scrap, including special treatments required for turnings, foil, and dross; on furnaces; melting practice; refining; and on methods of casting ingots, slabs and billets, and the production of granules. Concluding chapters deal with production of alloys and of the necessary hardeners, with utilization of by-products, and an outline of analytical and test methods. Footnote, references. (C21, A8, Al)

D

FERROUS REDUCTION AND REFINING

1-D. Interest in Continuous Steel Casting Gains Momentum. *Steel,* v. 127, Dec. 25, 1950, p. 68, 70, 72.

Developments reported at 8th Electric Furnace Committee, AIME, Conference, Pittsburgh, Dec. 7-9, 1950. (D9, ST)

2-D. Oxygen for Steel Refining. G. Husson. *Metal Progress,* v. 58, Dec. 1950, p. 868.

Investigations during the past 3 years by IRSID (the French Cooperative Institute for Steel Research) on the use of enriched air in steel metallurgy and its prospects of future success. (D general, B22, ST)

3-D. Babcock & Wilcox Tube Company Develops Continuous Casting. Isaac Harter, Jr. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 57-62.

Experimental work being done on the process. (D9, ST)

4-D. Trends in Electric Arc Furnace Practice. Donald L. Clark and James A. Clark. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 103-110.

15 references. (D5, ST)

5-D. Treatment of Brick to Prevent CO Disintegration. James A. Shea. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 116-119.

See abstract of "How to Prevent Blast Furnace Lining Disintegration", *Steel,* item 318-D, 1950. (D1)

6-D. Means of Modification of Gas Composition in the Blast-Furnace Throat and Their Influence on Utilization of Heat in the Blast Furnace. (In French.) Paul Thierry and Jean Szczeniowski. *Revue de Métallurgie,* v. 47, Oct. 1950, 739-759.

Reactions affecting efficiency of operation, methods of improving operating efficiency, and thermal effect of improving operating efficiency. Practical recommendations are given on the basis of the results. (D1, Fe)

7-D. An Extension in the Use of Rammed Silica Refractory Linings. (In Italian.) Antonio Scortecci, Aurelio Palazzi, and Francesco Savioli. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 297-298.

Application of a rammed quartzite lining in the uptake of a 50-ton openhearth furnace. (D2, ST)

8-D. Contribution to the Study of Wear of Ladle Nozzles. (In Italian.) Sergio Descovich and Francesco Savioli. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 309-311.

Theoretical analysis of the widening of nozzles during pouring of molten steel. Develops equation for the frictions of a fluid stream in contact with a highly viscous liquid varying with distance from the contact surface. The latter is essentially the state of the refractory nozzle walls during pouring. Theory is confirmed by experiment. (D9, ST)

9-D. Evaluation of the Bessemer Process in Small Converters. (In Italian.) Erich Lanzendorfer. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 312-320.

Previously abstracted from German version in *Neue Giesserei.* See item 141-D, 1950. (D3, ST)

10-D. Continuous Casting Featured at Electric Furnace Meeting. *Iron Age,* v. 166, Dec. 28, 1950, p. 66-67.

Summarizes proceedings of 8th Annual Electric Furnace Steel Conference, Pittsburgh, Dec. 7-9, 1950. (D9, ST)

11-D. Better Sulphur Elimination in Basic Open Hearth Melting. J. G. Rivet. *American Foundryman,* v. 18, Dec. 1950, p. 61-63.

Investigation to determine the cause and remedy for an increased scrap loss due to hot tears and cracks. It was decided that high sulfur content of the steel was probably responsible. Development of a satisfactory procedure for reducing the S content to below 0.03%, which remedied the trouble. (D2, ST)

12-D. Description of the Blast Furnace Controlled Split-Wind Blowing Installation at Algoma Steel Corp., Ltd. William O. Bishop. *Blast Furnace and Steel Plant,* v. 38, Dec. 1950, p. 1428-1434.

Split-wind blowing is defined as the delivering of wind simultaneously to two or more furnaces from a common main supplied by one or more units of blowing equipment. (D1, ST)

13-D. Improvements in Electric Furnace Design. F. V. Lewis. *Foundry Trade Journal,* v. 89, Dec. 14, 1950, p. 505-506.

Model TS Birlec Lectromelt steel-melting furnace, with rotary controller. Advantages of the latter, which was substituted for the original contactor-type controller. (D5, ST)

14-D. Iron; Deoxidation by Aluminium. H. A. Sloman and E. L. Evans. *Iron and Steel,* Nov. 28, 1950, p. 433-436; disc., p. 466-470.

See abstract of "Studies in the Deoxidation of Iron; Deoxidation by Aluminium," *Journal of the Iron and Steel Institute,* item 166-D, 1950. (D general, Fe, ST)

15-D. Sulphur; Thermodynamic Aspects of Its Movement Between Gas and Slag. F. D. Richardson and G. Withers. *Iron and Steel,* Nov. 28, 1950, p. 436-438; disc., p. 470-471.

See abstract of "Thermodynamic Aspects of the Movement of Sulphur Between Gas and Slag in the Basic Open-Hearth Process," *Journal of the Iron and Steel Institute,* item 165-D, 1950. (D2, B21, P12, ST)

16-D. Methods of Improving Basic Bessemer Steel. (In German.) *Stahl und Eisen,* v. 70, Nov. 9, 1950, p. 1077-1079.

Three laboratory experiments and one large-scale experiment made to find ways of reducing the P and N contents of the finished steel. By use of an oxygen-enriched blast, they have been reduced to 0.03 and 0.003%, respectively. (D3, ST)

17-D. Contributions to the Chemistry of Steelmaking During the Year 1949. (In German.) Paul Klinger. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 891-894; Oct. 12, 1950, p. 944-947; Nov. 9, 1950, p. 1080-1083.

A review. 104 ref. (D general, ST)

18-D. Bases for Calculation and Selection of Charge for Basic Openhearth Furnaces in Production of Ordinary Steel. (In Portuguese.) Piotr Krynicki. *Boletim da Associacao Brasileira de Metais,* v. 6, July 1950, p. 241-253.

Theoretical principles and mechanism of the openhearth process. (D2, ST)

19-D. Several Special Refining Processes and Their Application in Brazil. (In Portuguese.) Roberto Lanari. *Boletim de Associacao Brasileira*

de Metais, v. 6, July 1950, p. 254-272.
Modern methods of steelmaking critically analyzed from the point of view of their applicability in Brazil. 16 ref. (D general, ST)

20-D. Internal Stress Due to Cooling of the Cylindrical Steel Ingots. II. (In English.) Tokutaro Hirone and Noboru Tsuya. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 111-113.
Theoretical investigation of stresses in cylindrical ingots, having a small axial hole and cooled from the outside only. (D9, Q25, ST)

21-D. Germans Make Pig Iron Without Coking Coal. B. M. Pearson. *Iron Age,* v. 167, Jan. 11, 1951, p. 71-72.
Humboldt distillation process by which pig iron is produced in a low-shaft blast furnace. Ore fines and a noncoking coal are used in the form of briquettes. Noncoking coals rich in gas and tar are most suitable. The new furnace is only one-third the size of conventional blast furnaces, yet tonnages of iron from the two types are equal. (D1, Fe)

22-D. The Design of a New Open Hearth Shop. I. H. E. Warren, Jr. *Industrial Heating,* v. 17, Dec. 1950, p. 2160, 2162, 2164, 2166, 2241-2242.
Suggestions as to the facilities necessary for efficient production in any proposed new openhearth plant. Problems involved in the selection of the final layout and the auxiliary equipment. (D2, ST)

23-D. Pilot-Plant Smelting of Ilmenite in the Electric Furnace. C. Kerby Stoddard, Sandford S. Cole, L. T. Eck, and C. W. Davis. *U. S. Bureau of Mines,* Report of Investigations 4750, Dec. 1950, 15 pages.
A large-scale test on the removal of iron from ilmenite ore. Approximately 15 tons of slag containing 65-67% TiO_2 was produced from an ore containing about 30-45% TiO_2, producing a material suitable for TiO_2 pigment. The iron content was obtained as a pig iron of better potential market and strategic value. (D8, C21, Fe, Ti)

24-D. Alloy Steel Production in Large Basic Furnaces. A. K. Blough. *Journal of Metals,* v. 191, Jan. 1951, p. 30-32.
At Canton Steel Div., Republic Steel Corp., Canton, Ohio. (D5, AY)

25-D. Solution Loss and Reducing Power of Blast Furnace Gas. T. L. Joseph. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 37-43.
A study was made of the amount of solution loss necessary to maintain the reducing power of the gas stream in the blast furnace. Curves show the effect of solution loss, moisture in the blast, and CO_2 from the flux on the N_2 in the top gas. (D1, Fe)

26-D. Kinetic Study of the Reduction of Ferrous Oxide by Hydrogen. (In French.) Jacques Bénard and Jean Moreau. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 30, 1950, p. 904-906.
Mechanism of the reaction was investigated at several constant temperatures between 450 and 700° C. Method of investigation and results. (D general, P12, Fe)

27-D. The Effect of Carbon Content on the Desulfurizing of Iron Melts by a Lime-Fluorspar Crucible in a High-Frequency Furnace. (In German.) Wilhelm Anton Fischer and Theodor Cohnen. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 355-365; disc., p. 365-366.
Desulfurizing experiments with iron melts of different carbon contents ranging from about 0.10 to 3% showed that excellent results could be obtained when 15-20% fluorspar was added to the lime of which the crucible was made. Sulfur contents rapidly decreased with increasing carbon content. Results with lime and carborundum crucibles were less desirable. 16 ref. (D6, Fe)

E

FOUNDRY

1-E. Cupola Practice. S. Geigenbaum. *Metal Progress,* v. 58, Dec. 1950, p. 916, 918, 920, 922.
Reviews several recent articles from *British Cast Iron Research Association Journal of Research and Development.* Main topics are water-cooled cupolas, oxygen enrichment, and hot-blast cupolas. (E10, CI)

2-E. Basic Principles of Die Design; Disposition of the Die Cavity; The Use of Loose Die Inserts. H. K. Barton and L. C. Barton. *Machinery* (London), v. 77, Nov. 30, 1950, p. 568-574.
Refers to die casting. Clarified by diagrams. (E13)

3-E. Massive Steel Castings; Production at the Parkhead Works of William Beardmore & Company, Limited. A. R. Parkes. *Foundry Trade Journal,* v. 89, Nov. 30, 1950, p. 439-447.
(E11, CI)

4-E. Desulfurization of Cast Iron by Sodium Carbonate. (In French.) Jean Guillamon. *Fonderie,* Sept. 1950, p. 2186-2187.
Three methods used in the French casting industry. Optimum conditions for each of the methods. (EE, CI)

5-E. Development and Present Status of Binders for Molding Cores. (In French.) Pierre Nicolas. *Fonderie,* Oct. 1950, p. 2209-2215.
Methods and results of testing various binders as substitutes for linseed oil, the price of which reached prohibitive levels in France. A product designated as "Aglofran" is said to give satisfactory results. (E18)

6-E. Control of Gas Content in Light-Alloy Melts. (In French.) Gustave Caminade. *Fonderie,* Oct. 1950, p. 2220-2221.
Three practical methods and optimum conditions of operation for each method. (E25, Al)

7-E. Operational Difficulties in Foundries and Metallurgical Plants. (In German.) E. R. Thews. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 2, 1950, p. 499-500.
Means of preventing the gasification of metals in crucibles and precautions to be observed in the melting of brasses. (E10)

8-E. Determination of Moisture Content of Molding Materials. (In Czech.) Ladislav Jenicek. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 12-20.
A new method and apparatus which secures improved contact of the sample with the carbon crucible, hence more accurate results. (E18)

9-E. Technological Evaluation of Clay Binders and Sands Used for Green Sand Casting. (In Czech.) Lev Petrzela. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 21-43.
Derives mathematical expression for the relationship of compression strength, moisture content, permeability, and binder content. Data for 20 kaolinitic and montmorillonitic samples. (E18)

10-E. Research on Nodular Cast Iron. (In Czech.) Jan Plachy and Jan Chenicek. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 44-49.
Experiments using different metals as nodulizing agents. Addition of Mg alloy below the melt level and inoculation before addition give satisfactory results. Further research is aimed at substitution for Cu and Ni of other more readily available metals. (E25, CI)

11-E. Controlling the Shape of Graphite in Cast Iron. (In Czech.) Nikolaj Chvorinov. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 50-57.
Results of experiments. The strongest influences on the type of graphitization appear to be the amounts of dissolved S and O_2. (E25, CI)

12-E. Centrifugal Casting and Its Problems. (In Czech.) Vaclav Koutecky. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 57-61.
Procedures and equipment. Economic and technological factors. Claims that improvement in mechanical properties results for alloy steels, but not for carbon steels. (E14, CI)

13-E. Casting of Nonferrous Metal Ingots. (In Czech.) F. Kralik, *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 98-102.
Current casting methods, especially those used for casting Al and Cu. Detailed analysis of ingot defects. (E general, Al, Cu)

14-E. Flow Studies Develop Better Gating. *American Foundryman,* v. 18, Dec. 1950, p. 28-31.
Selected shots from a film produced at Battelle Memorial Institute on flow during pouring of Al and Mg castings. Transparent plastic molds and water (which has a kinematic viscosity similar to that of molten Al and Mg) are used in the research. New ideas in gating and confirmation of existing practices which have resulted from the work. (E22, Al, Mg)

15-E. Modern Foundry Methods: Cylinder Block Cleaning at Ford Motor Co. *American Foundryman,* v. 18, Dec. 1950, p. 42-45.
Includes knockout, external and internal shot blasting, shakeout, chipping, and pressure testing, as applied to cylinder blocks. (E24, L10, CI)

16-E. Core Sag Controlled. Tom Barlow. *American Foundryman,* v. 18, Dec. 1950, p. 57-60.
Use of southern bentonite to control the impact properties of green cores has resulted in reduction in number of cores scrapped for sag and distortion; in number of broken cores; in number of wires required per core; and, in rare cases, elimination of core driers. Effects in reducing the mobility of oil-sand cores and increasing impact strength were confirmed by laboratory investigations using three types of impact and sag tests. (E18)

17-E. Plaster Molds Give Close Tolerances. Edwin Bremer. *Foundry,* v. 79, Jan. 1951, p. 76-79, 144.
Manufacture of small castings to extremely close tolerances by the plaster-molding process on a production basis requires careful control and coordination of all operations from making the pattern to final inspection of the finished product. A number of ingenious arrangements have been developed at Universal Castings Corp., Chicago, to perform certain operations automatically, and thus reduce the chance of error. (E16)

18-E. Conversion to Castings Results From Foundry Engineering. *Foundry,* v. 79, Jan. 1951, p. 80-81.

(Page 25 follows after page 40A)

Metals Review
THE NEWS DIGEST MAGAZINE

Published by the American Society for Metals

Volume XXIV—No. 2 PART 2 February, 1951

Junior Members' Placement Service

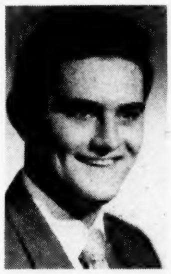
Listed on the following pages are the qualifications of junior members of the American Society for Metals who are graduating (or who are candidates for advanced degrees) in the field of metallurgy. All of these men will be available between now and next summer. They are grouped according to the school attended, on the pages indicated by the table of contents below. The name of the head of the department of metallurgy at the school, and in most instances, the name of the faculty member in charge of student placement, is indicated. Further information about any of these graduates may be secured from the head of the department or by writing to the student direct.

continued from Front Cover

University of Alabama

Paul Edward Hegmegee, Jr.
Candidate for B. S. in Met. Eng.

School Address: Box 5317, University, Ala.
Home Address: 128 Friar Lane, Clifton, N. J.



Age 20, single, member of National Guard. Associate in Arts degree, Fairleigh Dickinson College, Rutherford, N. J. Principal studies in phys. met., phys. chem., ceramic refractories, crystallography, structure of metals, corrosion. Member of A.I.M.E., A.I.Ch. E., A.F.S. Desires industrial work in producing industry; nonferrous. Preferably New York metropolitan area or Pennsylvania. Available June.

Sidney George Holder, Jr.
Candidate for M. S. in Met.

School Address: 2700 Heathermoor Rd., Birmingham 9,
Home Address: Same

Age 22, single. 2nd Lt. Cml-C, USAR. Thesis subject: internal friction studies on silver and its alloys. Courses on phys. met., structure of metals, metallography, pyrometry, light metals, fire assaying, foundry. Oak Ridge Grad. Fellow. Honorary fraternities; class president four years; pres., Ala. Junior Academy of Sci.; student gov. rep. Part-time instructor of met., ½ year. Desires research or teaching, preferably Ag and Cu. South, preferably Ala. or Tenn. Available August.

Tracy Mitchell Kegley, Jr.
Candidate for M. S. in Eng.

School Address: Box 5628, University, Ala.
Home Address: 890 7th Pl., West, Birmingham 4, Ala.

Age 27, single. Draft status 5A. Holds B. S. in Met. Eng. Thesis on effect of manganese on austenite-pearlite reaction rate. Courses include foundry, production met., physical met., pyrometry, met. calculations, light alloys, structure of metals. Oak Ridge Graduate Fellow. Experience: 1 year at Southern Research Institute. Desires research or producing industry, ferrous metals. South or East. Graduating Feb. 1951; availability uncertain.

Roland L. LeVaughn
Candidate for M.S. Degree

School Address: 12-B Druid Gardens, Tuscaloosa, Ala.
Home Address: 1717 18th St., Niagara Falls, N. Y.

Age 28, veteran, married, no children. Holds B.S. in Met. Eng. Thesis subject: effects of ferrosilicon-zirconium briquette additions to cupola charge. Three years as metallurgist with large ferro-alloy manufacturing company. Member A.F.S. Desires work in ferrous producing industry, preferably research. Will locate anywhere. Available July 15.

David L. McElroy
Candidate for B. S. Degree

School Address: Box 5545, University, Ala.
Home Address: 329 40th St., Fairfield, Ala.

Age 20, single. Draft status 1A. Courses include physical metallurgy, heat treatment, pyrometry, met. calculations, physical chemistry, mineral dressing, refractories. Honorary fraternity; Southern Assoc. of Science and Industry. General assistant on university program, working around department. Summer experience as inspector and wrapper in sheet mill. Desires producing industry or research, ferrous metals. Location South, preferably Alabama. Available June 2.

University of British Columbia

Alexander Goloubef
Candidate for B.A.Sc. (Met. Eng.)

School Address: 2766 West 4th Ave., Vancouver, B. C.
Home Address: Same

Age 29, veteran, 6 years in R.C.A.F., single. Elective courses include manufacturing processes, met. physics, metallography, mechanical metallurgy. Experience as salesman; instructor, Air Cadet Squadron; aeronautical inspector, R.C.A.F.; and in shops, mills and road crews to experience the ways of laborers; also mill and plant of Canadian Mining & Smelting Co. Public speaking, football, student publications. Desires industrial work in producing industry; interested in aluminum. Any location. Available May 10.

John Lund
Candidate for B.A.Sc. (Met. Eng.)

School Address: Fort Camp, U.B.C.
Home Address: 8620 Hudson St., Vancouver.

Age 22, single. Principal studies: phys. met., chem. met., mineral dressing, mining, thermodynamics, research, manufacturing methods. Two scholarships in junior year for highest standing in mining and metallurgy. Award by C.I.M.M. for best undergraduate metal-mining essay in 1950 in Canada. Summer employment with openhearth department of Steel Co. of Canada. Desires industrial research, preferably ferrous. Any location. Available May.

Ian R. MacDonald
Candidate for B.A.Sc. (Met. Eng.)

School Address: 4611 West 12th Ave., Vancouver, B. C.
Home Address: 278 Harvard Ave., Winnipeg, Man.

Age 25, veteran, registered with Can. Bur. of Tech. Personnel. Married, one child. Fourth-year fees paid by scholarship. Works 6 hr. per week on research problems in nonferrous metals, brazing of Al alloys, improving corrosion resistance of Mg by heat treatment. 14 months exp. as student met. in large Al sheet and extrusion production plant; 5 months as junior engr. with Al and Mg foundry and fabrication company. Desires industrial work in Al or Mg. Midwest or West preferred but not essential. Available May 15.

British Columbia (Cont.)

Douglas Hugh Polonis
Candidate for B.A.Sc. (Met. Eng.)

School Address: 142 W. 20th St., North Vancouver, B. C.
Home Address: Same

Age 22, single. Third and 4th-year training in strength of matls., mining matls. testing, mach. design. Phys. met. option in fourth year. Literature research reports in magnesite refractories and beryllium. Summer exp. in traffic management and traffic organization; also in shipyards in metal construction and fabrication methods. Would like industrial position in an organized company training program; ferrous production methods or refractories mfg. and application. Pacific Coast preferred but not essential. Available May 20.

Robert C. Shnay
Candidate for M.A.Sc. (Met. Eng.)

School Address: 5517 Kings Rd., Vancouver
Home Address: Same

Age 27, married, 1 child. Holds B.A.Sc. deg. with 1st class honors. Thesis on a magnetic study of the austenite - bainite transformation. Studies include phys. met., metallography, chem. met., process met., mechanical met., metallurgical physics. Exp. in pouring room of steel company, driver-salesman for welding supplies, research assistant and asst. instructor, U.B.C. Desires ferrous research. Canada or West Coast U.S. preferred but not essential. Available June 1.

Brooklyn Polytechnic Institute

Robert G. Carlson
Candidate for B. Met. Eng.

School Address: 99 Livingston St., Brooklyn 2, N. Y.
Home Address: 6211 Eighth Ave., Brooklyn 20.

Age 22, single, inactive Naval Reserve. Also attended Mohawk College and Champlain College. Thesis on recrystallization of copper under applied stress. Served as vice-pres. A.I.M.E. student group, sec. and chairman, A.S.M. group. Exp. as lab. asst. in pouring of metals and making tensile and notched-impact samples. Desires research or development work in copper industry. East preferred, but any other part of country considered, also overseas (South America). Available now.

Henry Arnold Johnson
Candidate for B. Met. Eng.

School Address: 85 Livingston St., Brooklyn, N. Y.
Home Address: 611 41st St., Brooklyn 32.

Age 21, single, draft status 2A. Thesis on design and erection of a vacuum arc furnace for melting. Treas. and vice-chairman of student chapter A.S.M. At present working for professor on induction melting, foundry, general machine shop, heat treating and welding. Also some industrial exp. Desires development work, preferably nonferrous alloys production equipment. Interested in Ti and Zr. No territorial preference. Available June 11.

Fred F. Polizzano
Candidate for B. Met. Eng.

School Address: 69 Livingston St., Brooklyn, N. Y.
Home Address: 1669 76th St., Brooklyn.

Age 30, married, no children. Veteran, draft status 1C. Thesis on carbonitriding and industrial management. Part-time instructor in ferrous met. lab., and testing of matls. lab. Industrial exp. 2½ years in quality control, including metallography, chem. analysis, matls. testing, gage and tool control. Desires industrial work in ferrous producing industry. Northeastern region; New York City preferred but not essential. Available June 15.

Lawrence Sama
Candidate for B. Met. Eng.

School Address: 85 Livingston St., Brooklyn, N. Y.
Home Address: 21 Bellows Lane, Levittown, L. I., N. Y.

Age 28, married, 1 child. Draft status 1C. On honor roll three years. 5½ years exp. as technician and asst. met. with met. laboratory engaged in trouble shooting, testing and research; work in metallography, radiography, heat treat, mech. testing. Desires work in production control (phys. met.)—i.e. heat treating dept. of steel parts producer. Second choice, research in steel heat treatment. Prefers New York City or Long Island. Available June.

Stanley Weiss
Candidate for B.S. in Met. Eng.

School Address: 99 Livingston St., Brooklyn, N. Y.
Home Address: 494 Powell St., Brooklyn 12.

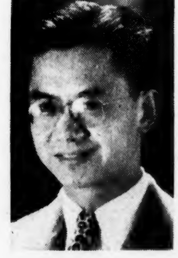
Age 21, single. Draft status 4F (knee injured in basketball, no limp). Thesis on welding of mild steel. Met. thermodynamics elective. Special honors: Dean's List. Public speaking. Desires research work, either ferrous or aluminum. West preferred but not essential. Available June 15.

University of California

John C. Chang
Candidate for Met. Engr.

School Address: Hearst Mining Bldg., U. of Calif.
Home Address: 2321 Haste St., Berkeley.

Age 31, married, no children. Holds M.S. in Met., U. of Calif.; B.S. of Mining and Met., 1942, Chiao-Tung Univ., China. M.S. thesis on basic openhearth slag. Co-author of final report, Temper Brittleness Research Project. Also phase diagram studies of Ca-Pb system. Competent in library research, anal. of iron and steel, metallography and heat treat, mech. testing, electric steelmaking. Ind. exp. with Kaiser Steel and Timken. Member Sigma Xi. Desires ferrous research. Calif. preferred but not essential. Available now.



Eugene H. Edwards
Candidate for Ph.D.

School Address: Rm. 168 Hearst Mining Bldg., U. of Cal.
Home Address: 1650 Shasta Ave., San Jose, Calif.

Age 28, married, 1 child. Lt., U.S.N.R. (inactive). Holds M.S. (phys met.) and B.S. (chem.). M.S. thesis on growth of twins in zinc single crystals. Member Sigma Xi, also chem. and math fraternities. Experience as co-op student sampler and student chemist, eng. officer U.S.N.R., lecturer on pre-engineering subjects, res. engr. on A.E.C. Deformation of Metals project. Desires producing industry or research, preferably nickel. Any location. Doctorate expected June '52, but available full time spring '51.

Carnegie Institute of Technology

Robert H. Anschuetz
Candidate for B.S. Degree

School Address: 1604 Sunrise Ave., Pittsburgh 21.
Home Address: Same

Age 21, single. Draft unclassified. Senior thesis on phase diagrams of brass. Phys. met. 9 hr. Holder of Carnegie Scholarship. Vice-pres. Society of Amer. Military Engineers (technical). Special studies include Army engineering extension courses, mech. engr. correspondence course. Summer work in openhearth. Desires producing industry or research, preferably steel, or aluminum. Pittsburgh preferred but not essential. Available June 20.

John Baird Barr, Jr.
Candidate for B.S. Degree

School Address: 327 17th Ave., Homestead, Pa.
Home Address: Same

Age 22, single. Draft status 1A. Thesis on reduction of oxygen in basic electric furnace. Member Metals Club. Athletics. Summer exp. in rolling mills and openhearth. Ferrous producing industry first choice; consuming industry and aluminum second choices. Pittsburgh preferred. Available June 15.

Leonard Mark Bianchi
Candidate for B.S. in Met. Eng.

School Address: Room 304 Boss Hall, Carnegie Tech
Home Address: 908 First St., Monessen, Pa.

Age 21, married, 1 child. Draft status 3A. Thesis on age hardening and sigma phase in austenitic stainless steels. Holder of Pittsburgh Plate Glass scholarship. Co-editor of student publication. Basketball. Desires research in producing industry. Any location. Available June 15.

Larry Edwin Bognar
Candidate for B.S. Degree

School Address: R.D. #9, Pittsburgh 28.
Home Address: Same.

Age 21, single, member R.O.T.C. Thesis on hydrogen treatment of boron steels. Seminar in public speaking. Member of Metals Club. Summer experience in blast furnace; also with Golomb Paint and Glass Co. and Allegheny Sand and Loam Co. Desires steel production research or Army ordnance. Pittsburgh preferred. Available June.

William Edward Bond
Candidate for B.S. Degree

School Address: 7155 Idlewild St., Pittsburgh 8.
Home Address: Same

Age 21, single, draft unclassified. Senior subjects include ferrous and nonferrous metallography, modern metallurgical practice, met. engineering, quantitative analysis. Active in public speaking, student publications, athletics. Member of Metals Club. Desires ferrous producing industry; consuming industry second choice. Any location. Available June 15.

Rointan F. Bunshah
Candidate for D. Sc. Degree

School Address: 5050 Forbes St., Pittsburgh 13, Pa.
Home Address: Bombay, India

Age 23, single. Graduated in metallurgy from University of Benares in India; will receive M.S. in June 1951. Thesis subject: kinetics of martensite-type transformations in metals. Holds Hadfield Medal of the Geological, Mining & Metallurgical Institute of India; member of Sigma Xi. Two summers' experience in openhearths, electric furnace, rolling mills. Desires research or teaching. New York City or neighborhood is first preference; West second. Will receive D. Sc. degree Jan. 1952.

William Cheesebrough
Candidate for B.S. Degree

School Address: Oakland, Pittsburgh
Home Address: 41 Schley Ave., Pittsburgh 5.

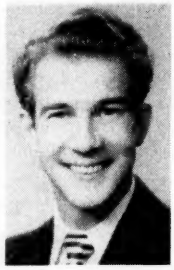
Age 21, single, draft 1A. Thesis on heat transfer coefficients of salt baths. Active in athletics, Metals Club. Summer experience in ceramic plant. Desires work in ferrous producing industry or research. Pittsburgh location preferred. Available June 15.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. See list on pages 1A and 2A.

Carnegie Tech (Cont.)

Donald A. Cogley
Candidate for B. S. in Met.

School Address: 917 Dickey St., Tarentum, Pa.
Home Address: Same



Age 24, married, no children. Veteran, 4A. Training in phys. met., process met. lab., met. operations, metallography, mechanical met., met. engineering. Thesis subject: vacuum melting and casting furnace. Summer work as laborer, clerk and technician in steel company. Desires industrial work in production or sales. Will locate anywhere in U. S. Available July 1.

William Colvin Cole
Candidate for B. S. Degree

School Address: 1091 Morewood Ave., Pittsburgh, Pa.
Home Address: 304 Highland Ave., Oak Hill, W. Virginia.

Age 21, single. Draft status 1-A. Two years R.O.T.C. Third and fourth year courses in phys. met., principles of met. operations, ferrous met., nonferrous met., process met., metallography, mech. met. and met. engineering. Prefers production industrial work or research. Preferably South. Available June 20.

John J. Cox, Jr.
Candidate for M. S. Degree

School Address: R. D. #1, Oakdale, Pa.
Home Address: Same.

Age 22, single. Draft status 1-A, being reclassified. Also attended Geneva College and Penn. State. Studied advanced phys. met., adv. mech. met., adv. phase diagrams, thermodynamics and theory and properties of metals. B. S. thesis subject: effect of germanium on electrodeposition of zinc. One year of ind. laboratory experience, one year as teaching assistant. Prefers research or ferrous producing industry. Preferably Pittsburgh. Available June 15.

Roy H. Curtis
Candidate for B. S. and B. A. Degrees

School Address: Box 328, Carnegie Tech., Pittsburgh, Pa.
Home Address: 13455 Harlan Ave., Lakewood 7, Ohio.

Age 23, single, draft status 1-A. Principal studies: phys. met., ferrous and non-ferrous met., principles of met., process metallurgy, metallography, mech. met., statistical quality control. Also attended Baldwin Wallace College. Three summers experience in steel mills, openhearth. Prefers producing industry, ferrous metals. Midwest preferred but not required. Available June 15.

Leland Joseph Green
Candidate for B. S. Degree

School Address: 5029 Morewood Pl., Pittsburgh 13, Pa.
Home Address: 1291 Ashland Rd., R.F.D. #4, Mansfield, Ohio.

Age 21, single. Draft status 1-D. R.O.T.C. Thesis: cooling rates after austenitizing of nodular cast iron and their effect upon mechanical properties. Student publications; member honorary military society. Summer work as production control clerk. Prefers ferrous producing industry. Western Pa. preferred but not essential. Available July 1.

Richard T. Huntoon
Candidate for D. Sc. Degree

School Address: 5634 Northumberland, Pittsburgh 17, Pa.
Home Address: Same.

Age 24, married, no children. 2nd Lt., inactive reserve. Holds B. S. and M. S. Westinghouse scholarship. Member honorary fraternities. Tech. chairman, Metals Club. Studied phys. met. —particularly in fields of solid state diffusion and oxidation kinetics—and ferrous metallography. Thesis: Permeability of copper membranes to zinc vapor. Summer experience on oxidation of iron with Westinghouse Research Labs. Prefers research or teaching. Will locate anywhere. Available Summer 1951.

Walter Kondratenko
Candidate for B. S. in Met. Eng.

School Address: 534 State St., N., Clairton, Pa.
Home Address: Same.

Age 33, married, 1 child. Veteran. Attended Keystone Radio Inst. and Univ. of Pittsburgh. Studies include phys. chem., phys. met., quan. anal., principles of met. operations, proc. met. lab., refractories, metallography, mech. met. Fulltime experience in wire plant and steel foundry; summer experience in openhearth. Prefers industrial work with ferrous metals; second choice—copper, aluminum. Any location. Available June 15.

Norris R. Logan
Candidate for B. S. Degree

School Address: 216 Hazel Drive, Pittsburgh 28, Pa.
Home Address: Same.

Age 21, single. Draft status 1-D. R.O.T.C. Courses include phys. chem., phys. met., principles of met. operations, process met. lab., metallography, mech. met. Desires producing industry or industrial work with ferrous metals. Prefers Pittsburgh area. Available June 15.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Carnegie Tech (Cont.)

Richard N. Lutz
Candidate for B. S. Degree

School Address: c/o Box 273, C.I.T., Pittsburgh 13, Pa.
Home Address: 550 Second St., Butler, Pa.

Age 25. Single. Draft status 4-A, veteran. Attended St. Vincent College 1946-1948. Senior thesis subject: use of sigma phase as age hardening mechanism in chromium-nickel steel. Worked summers in processing maintenance and general labor. Prefers training program, production or sales work. Eastern location desired but not essential. Available June 20.

Robert John MacDonald
Candidate for B. S. Degree

School Address: 727 North Euclid Ave., Pittsburgh 6, Pa.
Home Address: Same.

Age 24. Married. Draft status 4-A, veteran. B. A. degree Hiram College in math., 1949. Studied phys. chem., phys. met., principles of met. operations, process met. lab., metallography, mech. met., modern met. practice. Thesis subject: powder metallurgy. Member Metals Club. Summer work as lab. assistant, Carnegie-Illinois Steel Corp. Desires research, preferably producing industry. Available June 26.

Nicholas Mancuso
Candidate for B. S. in Met. Eng.

School Address: Box 192, C.I.T., Pittsburgh 13, Pa.
Home Address: Box 586, Tiltonsville, Ohio.

Age 24. Single. Draft status 4-A. Courses in phys. met., principles of met. operations, phys. chem., quan. anal., ferrous and non-ferrous met., process met., ferrous and non-ferrous metallography, mech. met., met. eng. Desires ferrous producing industry. Midwest location preferred. Available June 15.

Clifford W. McCoy
Candidate for B. S. Degree

School Address: 32 Haberman Ave., Pittsburgh 11, Pa.
Home Address: Same.

Age 23. Single. Draft status 4-A, veteran. Lewis E. Young Award 1950-51. Thesis: properties of molding sands. Part-time work as junior draftsman, foundry laborer. Summer assistant, metalworking fellowship, Mellon Instiute, 1950. Prefers foundry or fabrication, copper or aluminum. No territory preference. Available June 21.

Richard P. Nicholas
Candidate for B. S. in Met. Eng.

School Address: 235 Oakland Ave., Pittsburgh 13, Pa.
Home Address: Same.

Age 25. Married, one child. Veteran, status 4-A. Attended Cornell University. Thesis: reduction of a magnetite ore. Member of Metals Club and A. I. M. E. Worked 15 months as die casting operator. Desires producing industry or industrial work with ferrous metals. Pittsburgh location preferred. Available June 15.

Charles R. Rainesalo
Candidate for B. S. Degree

School Address: Box 274, C.I.T., Pittsburgh 13, Pa.
Home Address: 152 Park St., Corry, Pa.

Age 24. Married, no children. Draft status 4-A. Dean's list 4 years. Thesis: sigma phase in Fe-Cr alloys. Experience as patternmaker's helper approx. 2 years. Six months engineering study under Army specialized training program. Desires work in ferrous producing industry or research. East or midwest location preferred but not essential. Available June 15.

Nils Stokke
Candidate for M. S. Degree

School Address: c/o F. M. Schaefer, Fox Chapel Rd., Pittsburgh 15, Pa.
Home Address: Dale i Bruvik, Norway.

Age 28. Married. Draft exempt. Attended Ohio Univ. and Univ. of Pittsburgh. Holds B. S. in Ind. Eng. Courses in process met., phys. chem. and thermodynamics, adv. phys. met., adv. mech. met., metallography and crystallography, neat flow and pyrometry, adv. phase diagrams. Worked in research lab. on steel melting and refractories and in administrative position. Desires producing industry, preferably ferro-alloys. No location preference. Available June 15.

John Sydavar
Candidate for B. S. Degree

School Address: 117 Scobell Hall, 5124 Margaret Morrison St., Pittsburgh, Pa.
Home Address. 27A McKees Rocks Terrace, McKees Rocks, Pa.

Age 34. Single. Veteran with disability (4-A). Courses include process met. lab., phys. met., refractories, statistical quality control, metallography. Worked as gas welder with stainless steels. Desires ferrous producing industry, industrial work or developmental research in products or processes. East or midwest preferred. Available June 18.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Carnegie Tech (Cont.)

Salem Toney

Candidate for B. S. Degree

School Address: 1152 Fourth Ave., New Kensington, Pa.
Home Address: Same.

Age 22. Single. Draft status 1-A. Studied phys. met., principles of met. operations, process met. lab., phys. chem., metallography, mechanical met. Orontes Club scholarship, Crabtree Memorial scholarship. Summer work as research lab. technician, Carnegie-Illinois Steel Corp., metallography dept. Industrial work, teaching or research with ferrous metals. No location preference. Available June 18.

Patsy S. Trozzo

Candidate for B. S. Degree

School Address: 311 Oakland Ave., Pittsburgh 13, Pa.
Home Address: Same.

Age 24. Married. Draft status 4-A, veteran. Thesis: measuring change in electrical conductivity with formation of sigma phase in Fe-Cr steel; extensive literature survey and experimental work. Vice-pres. & treas. of Metals Club. Two years experience in integrated steel mill on maintenance. Prefers ferrous producing or consuming industry. No location preference. Available June.

Daniel L. Weller

Candidate for B. S. in Met. Eng.

School Address: 5010 Morewood Place, Pittsburgh 13, Pa.
Home Address: 127 E. Market St., Lewistown, Pa.

Age 23. Single. Draft status 4-A. Courses in phys. met., ferrous and non-ferrous met., process met., prin. met. operations., phys. chem., metallography, mech. met., modern metallurgical practice. Junior member A. I. M. E., Metals Club. Summer work as lab. assistant, research and development div. of Jones & Laughlin. Desires work in sales engineering or producing industry in steel. No location preference. Available June 15.

Peter J. Zorena

Candidate for B. S. Degree

School Address: 1919 Leishman Ave., Arnold, Pa.
Home Address: Same.

Age 22. Single. Draft status 1-A. Courses include ferrous and nonferrous met., mech. met., met. eng., modern met. practice, phys. met., phys. chem., ferrous and nonferrous metallography, process met., prin. of met. operations. Thesis: flotation of hematite. Student publications; sports. Experience as hardware sales clerk. Desires ferrous producing or consuming industries. Pittsburgh area preferred. Available June 16.

Case Institute of Technology

James Lewis Eirls

Candidate for B. S. Degree

School Address: 1636 Pontiac, East Cleveland 12, Ohio.
Home Address: Same.

Age 31. Marine Corps veteran. Married. Courses in met. processes, ore dressing, phys. chem., iron and steel, met. production, phys, met., practice of met. eng., elements of metal forming and adv. ferrous met. Experience includes three years industrial heat treating, summer and part-time work at strip mill and openhearth metallurgical dept. Desires consuming industry or industrial steel. Location preferences: Pacific Coast region, Salt Lake City, Utah or Denver, Colorado. Available July.

Fred Karpoff, Jr.

Candidate for B. S. in Met.

School Address: 4276 E. 160th St., Cleveland 20, Ohio.
Home Address: Same.

Age 28. Single. Draft status 1-C. Courses include ore dressing, phys. chem., iron and steel, met. processes, mech. of metallurgy, physical met., prod. met., foundry met., foundry tech. Member A. F. S., Foundry Educational scholarship. Experience as machinist, foundry work and as laborer and helper in construction company. Prefers foundry work, producing industry or research in ferrous metals. Midwest, preferably Cleveland. Available June 11.

Leo T. Klaehn

Candidate for B. S. in Met. Eng.

School Address: 3394 W. 88th St., Cleveland 2, Ohio.
Home Address: Same.

Age 26. Single. Draft status 4-A. Courses include ore dressing, phys. chem., iron and steel, production met., strength of materials, foundry met., foundry technology, met. engineering practice. Foundry Educational Foundation scholarship. Worked summers as trainee in foundry. Prefers ferrous foundry work. Midwest location. Available June 25.

Frederic H. Megerth

Candidate for B. S. in Met. Eng.

School Address: 2111 Abington Rd., Cleveland 6, Ohio.
Home Address: 129 Beverly Ave., Missoula, Mont.

Age 21. Single. Draft status 1-A. Prize scholarship, senior year, half tuition. Courses include ore dressing, met. processes, met. of iron and steel, production met. (non-ferrous), phys. met., practice of met. eng., adv. ferrous met., metal forming, optical mineralogy. Prefers producing industry, consuming industry or research work with non-ferrous metals (aluminum or copper). Western location preferred but not essential. Available June 25.

Case Tech (Cont.)

Robert P. Miller
Candidate for B. S. Degree

School Address: 11240 Bellflower Rd., Cleveland 6, Ohio.
Home Address: 790 McKinley St., Bedford, Ohio.

Age 24. Single. Draft status 4-A. Attended Denison Univ. and Union College, Schenectady, N. Y. Courses include met. processes, met. of iron and steel, phys. met., production met., adv. ferrous met., metals and alloys. Prefers work in producing industry or industrial work with ferrous metals. No location preference. Available July.

Elliott Harris Morris, Jr.
Candidate for B. S. Degree

School Address: 1299 Spruce Court #339, Cleveland 13, Ohio.
Home Address: Same.

Age 29. Married, one child. Draft status, Army reserve. Attended Univ. of Idaho 1½ years, Rollins College, Florida, 1½ years. Courses include foundry tech., nonferrous foundry, phys. met., nonferrous alloys, nonferrous production, iron and steel, met. forming and ore dressing. F.E.F. Scholarship, Case; athletic scholarship, Rollins. Prefers work in producing industry or development. No location preference. Available now.

Norman S. Pintchuk
Candidate for B. S. in Met.

School Address: Case Institute.
Home Address: 2923 N. Nordica, Chicago 34, Ill.

Age 28. Single. Veteran. Subjects include mech. properties of metals, ore dressing and materials preparation, production met., foundry met., foundry technology, physical met., practice of met. engineering, iron and steel production. Foundry Educational Scholarship. Member A. F. S. Worked summers as eng. trainee in core room, cleaning and melting depts. Prefers producing industry or industrial work, ferrous. Midwest or far west location. Available July 1.

Richard B. Smith
Candidate for B. S. in Met.

School Address: 2114 Stearns Rd., Cleveland, Ohio.
Home Address: 2107 Myrtle Ave., N. W., Canton, Ohio.

Age 21. Single. 1-A draft status. Studied ore dressing, met. processes, met. of iron and steel, production met., nonferrous production, physical met., adv. ferrous met., elements of metal forming, practice of metallurgical eng. Student publication; football; honorary fraternities. Prefers work in ferrous producing industry; second choice aluminum. Midwest location. Available July 1.

Richard H. Swiers
Candidate for B. S. in Met. Eng.

School Address: 2133 Abington Rd., Cleveland 6, Ohio.
Home Address: 115 Denison Ave., Elyria, Ohio.

Age 21. Single. 1-A draft status. Courses in met. processes, ore dressing, iron and steel, adv. iron and steel, production met., physical met., metals forming. Summer work in seamless pipe industry as student engineer in large steel plant; some light experimental work along a producing line. Prefers producing industry or industrial work, ferrous metals or Al. Midwest preferred but will go anywhere in U. S. Available June 9.

Richard A. Weaver
Candidate for B. S. Degree

School Address: 2744 Mayfield Rd., Cleveland 6, Ohio.
Home Address: R. D. #2, Clarion, Pa.

Age 25. Married. 4-A draft status. Attended Clarion State Teachers College. Courses in met. processes, phys. chemistry, ore dressing, ferrous met., adv. ferrous metallurgy, met. forming, phys. met., production met. Desires producing industry work or research. Aluminum, first choice; ferrous metals second. Pennsylvania preferred. Available June 15.

University of Cincinnati

Herbert L. Klebanow
Candidate for Met. Eng. Degree

School Address: 3951 Abington Ave., Cincinnati 29, Ohio.
Home Address: Same.

Age 24. Single. Veteran. Studied met. and properties of cast metals, foundry tech., foundry tech. lab., met. operations, casting, powder met., welding and machining, heat treatment, extraction met., electromet., corrosion and surface reactions, theories of phys. met., met. spec. Member A. F. S., A. I. Ch. E. Four years co-op foundry work. Desires ferrous producing industry or sales. Midwest location (Ohio, Indiana) preferred but not essential. Available July 1.

John Maranchik, Jr.
Candidate for Met. Eng. Degree

School Address: 112-E. University Ave., Cincinnati 19, Ohio.
Home Address: Same.

Age 31. Inactive Reserve. Married, 2 children. Courses in microscopy and X-ray lab., metallography and properties of cast metals, surface reactions, theories of phys. met., foundry tech. Member A. I. Ch. E. Full-time work (1½ yrs.) met. lab. asst. and referred melt clerk for steel company. Met. lab. assistant at University. Co-op work on machining tests, metallography. Desires producing industry, machining research, ferrous. Any location. Available June 15.

Cincinnati (Cont.)

Leonard J. Nowikowski
Candidate for Met. Eng. degree

School Address: 636 Crescent Ave., Covington, Ky.
Home Address: Same.

Age 32. Married, one child. Veteran. Courses in thermodynamics, electromet., metal process eng., metallography of cast metals, theories of met., foundry tech. Foundry Educational Foundation Scholarship. Member A. F. S., Ohio Soc. of Prof. Eng. Co-operative work: 2 years in foundry; 1 year metal cutting research. Prefers ferrous producing industry or research. Midwest location preferred but not essential. Available June 17.

James E. Wilson
Candidate for Met. Eng. Degree

School Address: 3317 Jefferson Ave., Cincinnati 20, Ohio.
Home Address: Same.

Age 26. Married, 1 child. Vet. Army Air Force training at Syracuse Univ. and others. Courses in met. process engineering, metallography, surface reactions, foundry techniques, met. theories. Member A. I. Ch. E. Part-time research and production control, inspection of cores and castings. Prefers producing or consuming industries. Midwest. Available June.

Colorado School of Mines

Richard L. Beck
Candidate for Met. Eng. Degree

School Address: 4936 Clay St., Denver, Colo.
Home Address: Same.

Age 22. Married. R.O.T.C. One year Regis College. Courses: general met., nonferrous prod., fuels, iron and steel, fire assaying, mineral dressing, hydromet., metallography, spectrography, indus, relations, met. design, ind. mineral processing. Worked as lab. assistant part-time for Climax at Colo. Schl. of Mines experimental plant. Research on rare metals, first choice; or producing industry. Midwest or south preferred but not essential. Available June 1.

Robert D. Briscoe
Candidate for Met. Eng. Degree

School Address: Box 49, Golden, Colo.
Home Address: 863 Emerson, Denver, Colo.

Age 26. Married. Air Force Inactive Reserve. 1 year Syracuse Univ. Courses in assaying, hydrometallurgy, iron and steel, fuels, phys. metallurgy, spectroscopy, ore dressing, ternary phase systems, thermochemistry. Desires ferrous consuming industry or industrial work; second choice brass. Prefers east of Miss. River but will go anywhere. Available June 1.

Harry L. Brown
Candidate for M. S. Degree

School Address: 22 Prospector Park, Golden, Colo.
Home Address: 1657 Kearney St., Denver 7. Colo.

Age 27. Married, 1 child. Draft status 5-A. Holds Met. Eng. degree. Thesis: galvanic corrosion of aluminum alloys. Studies are primarily in field of physical metallurgy and cover both practical and theoretical aspects. Part-time work as general mechanic, helper and melter in Al and brass foundry, helper in refractories plant. Desires industrial work with nonferrous metals (aluminum, brasses). Prefers Denver or vicinity. Available June 15.

Pete A. DeSantis
Candidate for Met. Eng. Degree

School Address: 1023 12th St., Golden, Colo.
Home Address: Box 192, Frederick, Colo.

Age 24. Single. Vet. Prescribed met. eng. courses plus metallurgy and uses of rare metals. President honorary fraternity. Summer work in metallizing plant and hydrometallurgical plant. Desires producing industry or research work with ferrous metals. Midwest or western location preferred but not essential. Available June 5.

Joseph R. Driear
Candidate for M. S. Degree

School Address: 1020 13th St., Golden, Colo.
Home Address: 1155 Illinois St., Sheridan, Wyoming.

Age 26. Married. Holds reserve commission in Corps of Engineers. Holds Met. Eng. degree. Graduate courses include adv. met., adv. metallography, physics of metals, chem. theromdynamics, cast iron metallurgy, X-ray diffraction and crystal structure. J. F. Lincoln Foundation award for paper on "Underwater Arc Welding." Vice-chairman A.S.M. student group. Worked summers as truck mechanic. Desires research on atomic energy; ferrous metals, aluminum and magnesium; teaching second choice. Any location. Available June 15.

Irving W. Glater
Candidate for Met. Eng. Degree

School Address: 822 12th St., Golden, Colo.
Home Address: 282 Washington St., Hartford 6, Conn.

Age 24. Single. Reserve commission. Veteran. Attended Univ. of Connecticut 1947-1948. Courses include prescribed subjects plus phase equilibria in metals, industrial relations, met. design. Worked as machinist's helper, automobile mechanic and insurance clerk. Prefers research in high temperature metals or brass. Consuming industry second choice. Northeast U. S. location preference. Available June 15.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Colorado (Cont.)

Frederick T. Inouye
Candidate for Prof. Met. Eng.

School Address: 1023 12th St., Golden, Colo.
Home Address: Same.

Age 24. Single. Veteran. Took prescribed met. eng. subjects plus German, economics, industrial relations, mining, electrical engineering, the rare elements. Holds joint-honor scholarship. Prefers producing industry work or research with Cu, Mn, Zn-Pb, or Cr. No location preference. Available June 15.

Richard L. Klebe
Candidate for Met. Eng. Degree

School Address: Alpha Tau Omega House, Golden, Colo.
Home Address: 909 Pleasant St., Oak Park, Ill.

Age 22. Single. 2nd Lt., Eng. Corp. Reserves. Attended Eau Claire State Teachers College, Wisc. Took prescribed Met. Eng. courses plus phase diagrams. Mention in 1950-51 College Who's Who. Member Tau Beta Pi, other honorary fraternities; student publications. Prefers work in nonferrous producing industry. Eastern location. Available June 18.

Kenneth B. Larson
Candidate for Met. Eng. Degree

School Address: Sigma Phi Epsilon, Golden, Colo.
Home Address: 123 West Second St., Mesa, Ariz.

Age 21. Single. Army R.O.T.C. Attended Colegio Santa Maria, San Isidro, Lima, Peru. Holds Foreign Service Journal Scholarship. Prescribed courses plus mill design, industrial minerals, assaying and pyrometallurgy. Member Tau Beta Pi. Speaks Spanish fluently. Summer work in silver-gold doré parting plant and lead-zinc flotation plant. Prefers producing industry, ferrous or Al, Cu, Ti. Will take foreign employment. Available June 1.

James B. Love
Candidate for Met. Eng. Degree

School Address: #16 Prospector Park, Golden, Colo.
Home Address: Same.

Age 27. Married, 2 children. R.O.T.C. Attended Michigan College of Mining and Technology. Courses include nonferrous metallurgy, fuels, assaying and pyrometallurgy, hydrometallurgy, mineral dressing, metallography, spectrography, metallurgical design, physical chemistry, industrial relations. Member Tau Beta Pi. Desires industrial work in consuming industry, ferrous or nonferrous. Rocky Mountain area preferred but not essential. Available June 1.

Paul M. Musgrove
Candidate for Met. Eng. Degree

School Address: 1100 12th St., Golden, Colo.
Home Address: Box 155, Kittredge, Colo.

Age 23. Single. Veteran. Attended Univ. of Denver 1945-1946. Courses include ternary phase diagrams, theory and practice of welding, plus usual met. eng. subjects. Active in sports. Secretary treasurer of A. S. M. chapter. Desires physical research in ferrous metals or producing industry. Midwest region preferred but not essential. Available May 30.

Ralph E. Musgrove
Candidate for Met. Eng. Degree

School Address: 1110 13th. St., Golden, Colo.
Home Address: R.F.D. #1, Chillicothe, Mo.

Age 22. Single. Draft status 1-A. Courses include metallurgy and uses of the rare metals, statistical quality control, and advanced mineral dressing in addition to prescribed subjects. Knowledge of French and Spanish. Desires sales or work with design and/or construction company. Location: South America (urban area), Africa or western United States. Available May 27.

Russell Charles Nelson
Candidate for D. Sc. Degree

School Address: 1616 Maple St., Golden, Colo.
Home Address: 112 Elmwood Ave., Bogota, N. J.

Age 25. Single. U.S.M.C.R., 2 years active service. B. S; Lehigh Univ. 1948; M. S., Colorado School of Mines, 1949. Teaching fellowship 1949-1951. Graduate courses include chemical thermodynamics, X-ray diffraction and crystal structure, ore deposits, nuclear chemistry. Doctor's thesis: flotation concentration of nonmagnetic taconites. Reads technical German and French. Desires teaching or research. Rocky Mountain or far west areas preferred but not essential. Available July 1.

Everett M. Patterson, Jr.
Candidate for Met. Eng. Degree

School Address: 1422 Joliet St., Aurora, Colo.
Home Address: Same.

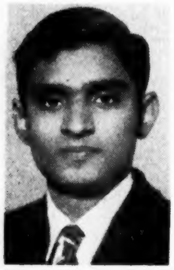
Age 28. Married, 1 child. Inactive U.S.N.R. Courses include ternary phase equilibria, metallurgical problems, met. thermodynamics, in addition to prescribed courses. Dean's honor roll. Chairman A.S.M chapter. Was a salesman prior to and during college. Prefers ferrous industrial or producing industry. No location preference. Available June 1.

Colorado (Cont.)

Thoni V. Pothen

Candidate for M. S. Degree

School Address: 706 15th St., Golden, Colo.
Home Address: Travancore, India.



Age 27. Single. Attended College of Mining and Metallurgy, Banaras Hindu Univ., India. Holds B. S. in Met. Thesis: Laboratory experiments on the isolation of ceria from monazite sands. Graduate subjects include mineral dressing, statistical quality control, adv. chem. thermodynamics, adv. nonferrous production met. Indian student scholarship. Conducted research in India on briquetting of coal. Prefers research or producing industry with ferrous metals or aluminum. Will locate anywhere in U. S. Available June.

Ivan Bruce Robinson

Candidate for Met. Eng. Degree

School Address: 822 12th St., Golden, Colo.
Home Address: 907 South 4th, Lamar, Colo.

Age 21. Reserve 2nd Lt. Single. Subjects include nonferrous production metallurgy; utilization, preparation, economics and marketing of fuels; iron and steel; assaying and pyrometallurgy; mineral dressing; principles of metallography; physical metallurgy. Distinguished military student. Worked on surveying crew summers. Desires research or producing industry, high-temperature or light metals: possibly alloy research. East or midwest location preferred. Available June 15.

Paul Richard Swanson

Candidate for Met. Eng. Degree

School Address: 1107 16th St., Golden, Colo.
Home Address: 217 Vermont Ave., Providence, R. I.

Age 28. Single. Inactive reserve. Courses include nonferrous production met., economics, utilization, preparation and marketing of fuels, met. of iron and steel, assaying and pyrometallurgy, mineral dressing. Student publications and athletics. Worked as physical science aide, U. S. Bureau of Mines, and hub and die cutter, part-time. Prefers research or industrial work with ferrous metals. Rocky Mountain or New England areas preferred but not essential. Available June.

James C. Ternahan, Jr.

Candidate for Met. Eng. Degree

School Address: 717 Arapahoe, Golden, Colo.
Home Address: Same.

Age 26. Married, 1 child. Veteran. Draft status 5-A. Courses include prescribed subjects as well as economics, adv. quantitative analysis. Summer work in building and transportation problems, bookkeeping, drafting. Three years in gold mine and mill including mining, mill operator and foreman. Graduate aeronautical engr., Curtiss-Wright Technical Inst. Prefers producing industry, copper, lead or zinc. Rocky Mountain or west location preference. Available June 10.

Richard E. Wayman

Candidate for Met. Eng. Degree

School Address: 914 14th St., Golden, Colo.
Home Address: Box 125, Milan, Ind.

Age 27. Single. Lt. (jg), U.S.N.R. Holds A. B. degree from Hanover College, Hanover, Ind. Courses include principles of metallography, physical metallurgy, practical spectrography, x-ray diffraction and crystal structure, physical chemistry, phase diagrams, chemical thermodynamics. Prefers producing or consuming industry, ferrous metals. Midwest location preference. Available June 1.

Columbia University

Erwin O. Deimel

Candidate for B. S. in Met.

School Address: 355 Lincoln Ave., Orange, N. J.
Home Address: Same.

Age 27. Married. Army Reserve. Attended Univ. of Penn. and Wagner College. Courses include pyrometry, phys. met., engr. met., phys. met. of steel, physical chem. lab., elements of extractive met., plasticity of metals, met. reports, mineral land laws. Knows technical German. Worked as dynamic balancer of centrifuges, lathe and machine tool work, chem. lab. assistant. Desires producing industry or research with titanium or other nonferrous metals. New England or East. Available July 1.

Cornell University

Alfred Blumstein

Candidate for B. Eng. Phys. Degree

School Address: 210 Thurston Ave., Ithaca, N. Y.
Home Address: 1212 Gilbert Place, New York, N. Y.

Age 21. Single. Year at Pratt Inst. Courses include applied phys. met., adv. eng. materials, electronic properties of liquids and solids, atomic and molecular physics, thermodynamics and kinetic theory of gases. Research project on damping capacity and other properties of nodular cast iron. New York State and Cornell scholarships. Ass't editor Cornell Engineer, editor Cornell Desk Book. Prefers development and research in ferrous producing industry. Any location. Available June 20.

William J. Johenning

Candidate for B. Met. Eng.

School Address: 309 College Ave., Ithaca, N. Y.
Home Address: 87-25 253 St., Bellerose, N. Y.

Age 28. Married. Draft status 5-A. Attended Champlain College and Univ. of Kentucky. Courses include eng. materials, applied phys. met., metallurgy of casting, working and welding. McMullen Scholarship. Worked four years as carpenter and joiner. Prefers ferrous industrial or producing industry. North Central or Northeast location preference. Available June 10.

Grove City College

Richard J. Haarbauer

Candidate for B. S. in Met. Eng.

School Address: 106 E. Poplar St., Grove City, Pa.
Home Address: 503 13th Ave., New Brighton, Pa.

Age 24. Single. Veteran. Attended Geneva College. Courses include phys. met., process ferrous met., metallography, heat treatment, met. of iron and steel, strength of materials. Lab. assistant in metallurgy, preparing and analyzing photomicrographs for visual aids instructor during summers. Prefers producing industry or industrial work with ferrous metals or Zn, Cu. Pittsburgh location preferred. Available June 12.

Kenneth D. Kelly

Candidate for Met. Engr.

School Address: South Hall, Grove City, Pa.
Home Address: Box 143, Bruin, Pa.

Age 25. Single. Veteran. Courses include heat treatment of steel, metallography, physical met., physical chem., thermodynamics, strength of materials. Member A. C. S. Worked summers as lab. technician in chemical plant. Prefers ferrous research or producing industry. Eastern or midwestern location. Available June 10.

James Melvin Maharg

Candidate for B. S. Degree

School Address: Box 120, Grove City College.
Home Address: 114 Polk St., Butler, Pa.

Age 23. Single. Draft status 4-A. Courses include algebra, trig., analytical geometry, calculus, diff. equations, general and applied physics, electricity, structure and properties of alloys, metallurgy of iron and steel. Member of Metallurgy Club, debating. Desires teaching or producing industry, preferably nodular cast iron. Eastern location. Available June 11.

William J. Masters

Candidate for B. S. in Met. Eng.

School Address: Box 272, Grove City College.
Home Address: 201 Maple St., Kittanning, Pa.

Age 23. Single. Draft status 4-A. Attended Duke Univ., Univ. of Pittsburgh. Courses include metallography, heat treatment, phys. chem., phys. met., ferrous met., quan. anal., strength of materials. Lab assistant in metallography courses and heat treatment. Worked as moulder in foundry, time keeper and cost clerk in repair shop summers. Desires producing industry or industrial work with ferrous metals. Pa., Ohio, or N. Y., preferred but not essential. Available June 15.

University of Illinois

Bruce W. Capek

Candidate for B. S. in Met. Eng.

School Address: 606 E. Stoughton Ave., Champaign, Ill.
Home Address: 229 Gage Rd., Riverside, Ill.

Age 20. Married. Draft status 1-A deferred. Courses include economics, business law, world mineral economics in addition to prescribed subjects. Pres. of Mineral Industries Society. Univ. scholarship key, bronze tablet. Worked summers in materials testing, cupola melting, heat treating, metallography and development. Desires industrial or engineering sales, preferably ferrous. Midwest or east preferred but not essential. Available June 18.

Donald L. Macleary

Candidate for B. S. Degree

School Address: 102 E. Chalmers St., Champaign, Ill.
Home Address: 818 S. Grant St., Hinsdale, Ill.

Age 22. Single. 1-A draft status. Attended Univ. of Arizona. Courses include pyrometry, sociology, dc and ac equipment, alloy steels, theoretical and applied mechanics testing lab. as well as prescribed subjects. Desires consuming industry, sales or producing industry, either ferrous or nonferrous (copper, aluminum). No location preference. Available July.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Robert M. Necheles

Candidate for B. S. in Met. Eng.

School Address: 1215 S. 4th, Champaign, Ill.
Home Address: 1715 Bryn Mawr, Chicago, Ill.

Age 22. Single. Draft status 1-A. Courses include phys. met., metallurgy of iron and steel, met. calculations, metallography, alloy steels, met. of deep drawing and pressing, powder met., resistance of materials, applications of electrical equipment. Desires producing or consuming industry, nonferrous metals. Midwest or west location, preferably Chicago. Available July 1.

Frank C. Rally

Candidate for B. S. Degree

School Address: 604 East Armory, Champaign, Ill.
Home Address: 125 North Court St., Rockford, Ill.

Age 22. Single. Reserve commission. Courses include introduction to physical met., metallurgical calculations, ferrous production and metallography, electrometallurgy, metallography, production metallurgy, alloy steels, adv. physical met., resistance of materials, physical chemistry. Member Mineral Industries Society. Summer work in general heat treating. Prefers producing industry, either ferrous or nonferrous. Midwest, east or southwest location. Available June.

Illinois (Cont.)

Kenneth D. Shimmin
Candidate for B. S. in Met. Eng.
School Address: 107 S. Lincoln Ave., Urbana, Ill.
Home Address: 3201 Valley St., Burlington, Iowa.

Age 22. Single. Draft status 2-A. Courses include metallography, physical metallurgy and physical chemistry. College honors 1948 and 1949. Tau Beta Pi and other honorary fraternities. Student assistant in investigation of creep, ductility and fracture of lead cable sheaths. Prefers consuming industry, especially in automotive field. Midwest. Available June 15.

Iowa State College

Richard D. Miller
Candidate for B. S. Degree
School Address: 414 Pammel Court, Ames, Iowa.
Home Address: 3812 Oxford, Des Moines, Iowa.

Age 23. Married. Inactive reserve. Courses include heating, ventilating, refrigeration and air conditioning, design, thermodynamics. Junior member A.S.M.E., A.S.H.V.E., honorary fraternity. Worked summers as inspector and in shopwork at steel plant. Desires research or producing industry, or air conditioning or refrigerating equipment manufacture. Midwest preferred but not essential. Available June 15.

Donald L. Swanson
Candidate for B. S. in Mech. Eng.
School Address: Box 208, Station A, Ames, Iowa.
Home Address: Route 3, Emmetsburg, Iowa.

Age 25. Married. Draft status 3-A. Courses include machine design, internal combustion engines, metallurgy, steel and its applications. Worked summers in material purchasing and research experiment and design of mechanical apparatus. Desires mechanical research and development with emphasis on metallurgical problems. East or midwest. Available July 1.

University of Kansas

Kermit J. Oswalt
Candidate for B. S. in Met. Eng.
School Address: 1306½ New Hampshire, Lawrence, Kan.
Home Address: Same.

Age 24. Married. Draft status 4-F. Courses include general metallurgy, fire assaying, nonferrous metallurgy, met. of iron and steel, metallography, ore dressing, physical metallurgy, cast metals. Member A.F.S. Worked 13 months in foundry engineering department. Desires work with ferrous metals. Midwest preferred but not essential. Available June 12.

University of Kentucky

Von E. Jennings
Candidate for B. S. in Met. Eng.
School Address: Bldg. 110, Apt. 4, Shawneetown, Lexington, Ky.
Home Address: Same.

Age 30. Married, 1 child. Veteran. Courses include physical metallurgy, met. procedure and techniques, met. lab. and shop practice, foundry and foundry practice, physical chemistry, heat and thermodynamics. Worked for aluminum company and as radio technician. Desires industrial or producing industry, nonferrous preferably Al or other light metals. Prefers south or southwest but not essential. Available June.

James Quinn Lackey
Candidate for B. S. Degree
School Address: 239 South Limestone St., Lexington, Ky.
Home Address: 213 West Main St., Louisa, Ky.

Age 23. Single. Draft status 1-C. Courses include metallography, heat treatment, X-ray, physical metallurgy, foundry, nonferrous and ferrous metallurgy, and metallurgical calculation. R.O.T.C. Worked summers in foundry. Desires producing industry or research, ferrous metals or aluminum. Midwest or southern location preferred. Available Feb. 15.

Adolph P. Rasmussen
Candidate for B. S. in Met. Eng.
School Address: Box 5897, Univ. of Ky., Lexington, Ky.
Home Address: 11143 South Artesian Ave., Chicago 43, Ill.

Age 24. Single. U.S.N.R. (Reserve). Attended Illinois Institute of Technology. Courses include statics and strength of mat. organic chemistry, physics of metals, extractive metallurgy, shop practice, in addition to prescribed subjects. Vice-pres. college chapters A.S.M. and A.I.M.E., vice-president graduating class. Worked 1 summer as lab technician on analytical work. Desires ferrous producing or consuming industry. No location preference. Available June.

John Joseph Rudy
Candidate for B. S. in Met. Eng.
School Address: 281 South Limestone, Lexington, Ky.
Home Address: 715 Forest Ave., Maysville, Ky.

Age 25. Single. Veteran. Courses include ferrous and nonferrous met., physics of metals, principles of X-rays, metallurgical calculations, thermodynamics, physical chemistry, business law and principles of economics. Chairman of A.S.M. group at University. Various summer jobs. Desires producing or consuming industry in Al, Mg, or Ni. Houston, Texas preference. Available June 15.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Kentucky (Cont.)

Walter C. Swanson

Candidate for M. S. Degree

School Address: 559 Chipman Dr., Lexington, Ky.
Home Address: 515 Poplar St., Ravenna, Ky.

Age 30. Married, 1 child. Veteran. Attended Upsala College, East Orange, N. J. Courses include physical metallurgy, thermodynamics, foundry, physical chemistry, adv. physical metallurgy. Thesis subject: dry method of reclaiming foundry sands. Research assistantship. Worked in university foundry 2 years. Assisted in designing commercial apparatus for sand reclamation. Desires producing industry or research in ferrous metals. East or central states. Available July.

Kyle R. White

Candidate for B. S. in Met. Eng.

School Address: 1120 13th St., Huntington, W. Va.
Home Address: Same.

Age 24. Married. Draft status 4-A. Courses include physics of metals, metallurgical calculations, heat treatment, shop course in foundry, metallography. Worked in university foundry. Prefers producing industry or industrial work with ferrous metals or aluminum or bronze foundry. No territory preference. Available Feb. 1.

Lafayette College

Robert Joseph Barbero

Candidate for B. S. Degree

School Address: Kappa Sigma Fraternity, Lafayette, College, Easton, Pa.
Home Address: 206 Lily Street, Paterson, N. J.

Age 21. Single. Draft status 1-A, U.S.N.R. Attended Paterson State Teacher's College. Courses include physical metallurgy, iron and steel, advanced physical metallurgy, nonferrous metallurgy, light metals, foundry. One summer at Aluminum Company. Desires producing industry or industrial work, preferably aluminum. Eastern location. Available June.

George Bramson

Candidate for B. S. in Met. Eng.

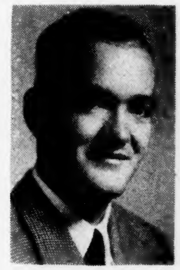
School Address: 406 Watson Hall, Easton, Pa.
Home Address: 277 Howard Ave., Passaic, N. J.

Age 23. Single. Draft status 1-A. Attended Stevens Inst. of Tech. and Sampson College. Courses include physical metallurgy, adv. physical metallurgy, physical chemistry, fuels, calculations, mineral dressing, met. thermodynamics, iron and steel, nonferrous met., light metals. Active in sports and club work. Worked summers as lab. assistant (testing and lead). Desires consuming or producing industry, light metals. Northeast preference. Available June 11.

Douglas MacNeil Brown, Jr.

Candidate for B. S. Degree

School Address: 219 Soles Hall, Lafayette College, Easton, Pa.
Home Address: 296 Bradley Ave., Meriden, Conn.



Age 23. Single. Draft status A-1. Courses include physical and adv. physical metallurgy, iron and steel, fuels, metallurgical calculations, nonferrous metallurgy, thermodynamics, adv. foundry, light metals. On scholarship loan. Worked summer in metallurgical laboratory as assistant. Prefers work with sterling silver or aluminum. No location preference. Available June 16.

Theodore Hillman, 3rd.

Candidate for Met. Eng. Degree

School Address: Theta Chi Frat., Easton, Pa.
Home Address: 30 Woodside Ave., Trenton, N. J.

Age 21. Single. Courses include elementary and advanced physical metallurgy, physical chemistry, metallurgy of iron and steel, nonferrous metallurgy, light metals, thermodynamics. Prefers research or producing industry with ferrous metals. Eastern location preference. Available June 11.

Ludlow H. Kaeser

Candidate for B. S. in Met. Eng.

School Address: 141 March Field, Easton, Pa.
Home Address: Same.

Age 28. Married, 1 child. 4-A draft status. Attended Worcester Polytechnic Inst. Courses include physical metallurgy, fuels, steel production, thermodynamics, machine design. Scholarship award senior year. Worked as draftsman, sales trainee. Advanced from student instructor in elementary heat power lab to instructor in mechanical lab. at the university. Prefers consuming or producing industry, ferrous metals or brass. Either east or west coast or foreign location preference. Available July 1.

John W. Musser

Candidate for B. S. in Met. Eng.

School Address: 12 Sullivan Village, Easton, Pa.
Home Address: Same.

Age 25. Single. 4-A draft status. Attended Univ. of Florida and Penn. Area College Centers. Courses include physical metallurgy, iron and steel, advanced physical metallurgy, nonferrous metallurgy, thermodynamics, foundry, light metals, chem. eng. Worked as inspector and laboratory technician, clerk, solder, drawing. Prefers production or process development work. No territory preference. Available June 11.

***FOR FURTHER INFORMATION** about these graduates*
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Lafayette (Cont.)

Hilton N. Rahn, Jr.
Candidate for B. S. in Met. Eng.

School Address: 641 Belvidere Rd., Phillipsburg, N. J.
Home Address: Same.

Age 22. Single. 2-A draft status. Courses include physical chemistry, physical metallurgy, iron and steel, nonferrous metallurgy, thermodynamics and light metals. Dean's list three years. Member A.C.S. and Tau Beta Pi. Worked summers as lab and foundry assistant. Prefers producing industry or extractive work with ferrous metals or zinc. East or midwest location. Available June 15.

John W. Sullivan
Candidate for B. S. in Met. Eng.

School Address: 1635 Northampton St., Easton, Pa.
Home Address: Same.

Age 25. Married, 1 child. 4-A draft status. Courses include physical chemistry, iron and steel, nonferrous metallurgy, advanced physical metallurgy, light metals. Summer experience in steel and iron foundries on electric furnaces and cupolas. Also in physical and chemistry testing laboratories. Prefers industrial or producing industry, iron and steel. Pennsylvania preference. Available June 11.

Lehigh University

Theodore G. Alteneder, Jr.
Candidate for B. S. Degree

School Address: B-112 Dravo, Bethlehem, Pa.
Home Address: 5336 N. 15th St., Philadelphia 41, Pa.

Age 28. Single. 5-A draft status. Courses include electrometallurgy, iron and steel, physical metallurgy, nonferrous metallurgy, literature research in selective hardening. 1951 Who's Who in American Colleges. Worked summers and 1 year in instrument factory doing drafting and machine work. Prefers precision manufacturing or industrial work with ferrous metals. East preferred but not essential. Available June 25.

Michael R. Conner
Candidate for B. S. in Met. Eng.

School Address: 1232 Telford Lane, Bethlehem, Pa.
Home Address: 433 Walnut St., Lebanon, Pa.

Age 27. Married, 1 child. 5-A draft status. Courses include electrical circuits, strength of materials, ind. electronics, public speaking for technical men, research on grain size and energy relationships, plus prescribed subjects. Treasurer of Metallurgical Society. Summer work on rolling mills, physical testing laboratory. School work in refractory control lab. Desires research in electrometallurgy or producing industry, ferrous metals or Al. East or southwest. Available Aug. 1.

Richard George Gold
Candidate for M. S. in Met. Eng.

School Address: 1734 Sycamore St., Bethlehem, Pa.
Home Address: Same.

Age 25. Single. Draft status 4-F. Courses include ferrous metallurgy, nonferrous metallurgy, physical metallurgy, radiation methods, corrosion, process control, unit processes. Thesis: corrosion of Al in neutral solutions under oxygen pressure. Graduated with honors; B. S. in Ch. Eng. Desires producing industry or research, ferrous metals; Al second choice. East preferred. Available now.

Thomas M. Griffin
Candidate for B. S. in Met. Eng.

School Address: 264 E. Broad St., Bethlehem, Pa.
Home Address: Same.

Age 33. Married. Lt. Cdr. U.S.N.R. Attended Montana School of Mines and University of Kentucky. Courses include electrometallurgy, iron and steel, physical metallurgy, metallography and nonferrous production. Commercial aviation pilot. Worked 3 years as bank bookkeeper, 2 months as laborer in zinc dept., 2 months in openhearth and laboratory in Brazil. Desires sales or ferrous producing industry. Location immaterial. Available July 1.

Frederick Charles Langenberg
Candidate for M. S. Degree

School Address: 678 Ostrum St., Bethlehem, Pa.
Home Address: 301 Main St., Riverton, N. J.

Age 24. Single. Veteran. Holds B. S. in Met. Eng. "with highest honors." Courses include physical metallurgy, iron and steel, physical chemistry and finance. Thesis: fluidity of cast steel. Gotshall scholarship. Awarded A.I.M.E. Essay Prize for paper "Nodular Graphite in Cast Iron." Worked in research lab. and foundry summers. Prefers industrial or research work with ferrous metals. No location preference. Available June.

James J. Lombardo
Candidate for B. S. in Met. Eng.

School Address: Santee Mill Road, R. D. #1, Bethlehem, Pa.
Home Address: 626 Ferne Ave., Drexel Hill, Pa.

Age 30. Married. Inactive reserve. Courses include ferrous and nonferrous metallurgy, physical chemistry, advanced electrometallurgy, X-rays, economics and labor problems. Sophomore honors. Secretary Metallurgical Society, student relations committee A.S.M. General shop work experience. Desires producing industry or research. Northeast preferred but not essential. Available June 20.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. See list on pages 1A and 2A.

Lehigh (Cont.)

Jan Marcel Ruzek
Candidate for M. S. in Met. Eng.

School Address: 729 Fiot Ave., Bethlehem, Pa.
Home Address: Same.

Age 36. Single. Holds Dipl. Ing. (Civil Engineering), Weld. Eng. and C. E. degrees from Technical Univ. of Prague, Czechoslovakia and Technical Univ. of Vienna, Austria. Courses include welding research and production. Thesis: welded pressure vessel steels under repeated load. Four years as research asst., Inst. of Research, Univ. of Prague; 3 years as welding engineer in SKODA works, Pilsen; 1 year as chief welding engineer in SKODA, 2 years in TATRA; 2 years as research asst. in Fritz Eng. Lab. at Lehigh. Desires ferrous research, producing industry or teaching. East or west coast. Available June.

Kay McNair Shupe
Candidate for M. S. Met.

School Address: 455 Carlton Ave., Bethlehem, Pa.
Home Address: 528 Spring St., Middletown, Pa.

Age 26. Married. Inactive reserve. Holds B. S. in Met. Prescribed subjects as well as minerology, assaying, met. calculations. Thesis: use of oxygen in the acid openhearth. Experience as journeyman electrician on construction of powerhouse. Desires ferrous production research. East preferred. Available June.

Murray B. Thomson
Candidate for B. S. in Met. Eng.

School Address: Taylor Hall, B-26., Lehigh Univ., Bethlehem, Pa.
Home Address: 103 Sixth St., Niagara Falls, N. Y.

Age 23. Single. 4-A draft status. Attended Syracuse and Rutgers Universities. Courses include iron and steel, nonferrous metals, physical metallurgy and metallography, electrometallurgy and electrochemistry, physical chemistry. Sophomore honors. 19 months employment in research lab on high-chromium steels. Desires producing industry or industrial work, with ferrous metals or ferro-alloys. Prefers western N. Y. or Southern Ontario, but not essential. Available July 1.

Walter J. Walek
Candidate for B. S. in Met. Eng.

School Address: 102 Richards House, Lehigh Univ., Bethlehem, Pa.
Home Address: 24 Ridgewood Rd., East Hartford, Conn.

Age 20. Single. Reserve commission. Courses include survey on principles and practices of carburizing, metallurgy of zinc and prescribed subjects. One-half tuition scholarship for 4 years. Metallurgy award. Has done organizational work. Worked summers as store clerk, and in store heat-treating department of Pratt & Whitney. Prefers research and development work with ferrous metals. Northeastern U. S. preferred but not essential. Available June 17.

Harry J. Weil
Candidate for B. S. in Met. Eng.

School Address: 521 Third Ave., Bethlehem, Pa.
Home Address: Same.

Age 23. Single. 1-A draft status. Courses include electrometallurgy, physical metallurgy, iron and steel, metallography, nonferrous metallurgy. Member Metallurgical Society, Lehigh. Worked as assistant mill provider in steel company. Prefers producing industry or industrial work with ferrous metals or copper, lead, zinc. East preferred but not essential. Available July 1.

John H. Wynne
Candidate for B. S. (Bus. Adm.)

School Address: 1029-A N. New St., Bethlehem, Pa.
Home Address: 318 E. Union St., Burlington, N. J.

Age 26. Married. Veteran, 4-A status. Holds B. S. in Met. Eng. Subjects include physical metallurgy, metallography, iron and steel, nonferrous met., research on precision casting, physical chemistry, electrometallurgy, metallurgy speech course. Summer work on impact testing of cast iron. Prefers producing industry or research with nonferrous metals (Al, Ti, Cu, Ag, Au). Prefers Philadelphia area. Available July 1.

Laval University

Jean Charles Trudelle
Candidate for B. Applied Sciences (Met. Eng.)

School Address: Charlesbourg, West, Quebec, Canada.
Home Address: Same.

Age 27. Single. Attended St. John Endes College of Arts. Holds B. A. degree. Courses include physical chemistry, metallography, heat treatment of steels, ore dressing, electrometallurgy, X-rays. Quebec Dept. of Mines scholarship for 1950-1951. Member Engineering Inst. of Canada. Summer work smelting and converting copper ores, ore dressing and concentrating. Desires research or producing industry in copper. Eastern location preference. Available May 15.

University of Manitoba

James Reid Finlay
Candidate for B. Sc. in Mech. Eng.

School Address: 136 Oak St., Winnipeg.
Home Address: Same.

Age 24, single. General mechanical engineering course. Summer experience 3 years in manufacturing plants; one year office work assisting an engineer in sales and service of welding supplies. Student member Engineering Institute of Canada. Desires work in manufacturing industry, preferably in Canada. Available June 1.

Manitoba (Cont.)

John Warywoda
Candidate for B. Sc. in Mech. Eng.

School Address: 1153 Manitoba Ave., Winnipeg.
Home Address: Same.

Age 29, married, 2 children. Senior year studies in met. and engineering chemistry (phase rule). Thesis subject: methods of improving the efficiency of gas turbines. Industrial exp. as machinist. Interested in producing industry. Eastern Canada preferred but not essential. Available now.

McGill University

Robert Kelly Buhr
Candidate for B. Eng. in Met.

School Address: 3485 McTavish Ave., Montreal.
Home Address: 943 Dorchester Ave., Winnipeg.

Age 24, single. Thesis on iron oxide reduction; senior studies in extractive met., phys. met., electrometallurgy, thermodynamics. Ten months summer exp. in nonferrous foundries, 3 months on openhearth, 11 months in research on zinc-base die-casting alloys. Work in brass, bronze or aluminum production foundry is first choice. Canada or midwest U. S. preferred but not essential. Available May.

Clifford H. Cameron
Candidate for B. Ent. in Met.

School Address: 3485 McTavish St., Montreal.
Home Address: 252 Main St., Lennoxville, P. Q., Canada.

Age 27, to be married in May. Voluntary reserve R.C.A.F. Senior studies met. of iron and steel, extractive met., phys. met., electromet., thesis, phys. chem., chem. thermodynamics. Ten months summer exp. in copper smelting, rolling mill observation, openhearth observation. Ferrous producing industry first choice. East or midwest preferred but not essential. Available June 15.

Charles E. Gouin
Candidate for B. Eng. in Met.

School Address: 858 Sherbrooke E., Montreal.
Home Address: Same.

Age 26, single, veteran of Canadian Navy. Department of Mines Scholarships 1948-49-50; class standing—6 on 21. Bilingual; fluent in both English and French. Experience in steel foundry 3½ years training as student engr.; 5 months in radioactivity division on extraction of uranium ores. Desires industrial work, preferably in producing industry, or engineering sales. Eastern Canada preferred. Available June.

G. Grant Green
Candidate for B. Eng. in Met.

School Address: 8011 Champagneur Ave., Apt. 6, Montreal, Que.
Home Address: Same.

Age 24, single. Holds B. Sc. degree. Interested in public speaking, athletics, music, Boy Scouts Assoc. Experience: 8 months openhearth and electric steel furnaces, 5 months steel rolling mill, 4 months inspection work. Sales engineering first choice; industrial engineering second. Eastern Canada or U.S.A. preferred. Available June 1.

Jack E. Gunn
Candidate for B. Eng. in Met.

School Address: 769 Desmarchais Blvd., Verdun, P. Q.
Home Address: Same.

Age 28, single, veteran (R.C.A.F. Reserve). Final year thesis on sintering of blast furnace dust; colloquium on basic refractories in steel furnaces. Bureau of Mines scholarships 1949-50-51; first class honors. Three summers' employment at Noranda Mines experimental sinter plant. First choice: work in iron sintering; second choice: ferrous research. Any location. Available June 1.

Maurice E. Laperriere
Candidate for B. Eng. in Met.

School Address: 262 Riviera, Plage Laval, P. Q.
Home Address: Same.

Age 29, married, 1 child. Has attended LaSalle Academy and Lisgar Collegiate Institute, Ottawa. Senior studies: met. of iron and steel, extractive met., phys. met., electrometallurgy, thesis, phys. chem., thermodynamics, mineral dressing. Practical experience in metallurgical industry (15 months summer employment). Ferrous industry preferred. Available May 1.

Guy A. Leclair
Candidate for B. Eng. in Met.

School Address: 7 McCulloch Ave., Outremont (Montreal)
Home Address: Same.

Age 23, single, R.C.A.F. Reserve class "F". Class standing 7 on 21. Commissioned in R.C.A.F. as P/O in radio-wireless branch; 8 months practical summer experience in metallurgical plants. Bilingual (English and French fluently). Ferrous industry preferred but not essential; consuming or engineering sales. Western Canada or U. S. preferred but not essential. Available mid-June.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

McGill (Cont.)

John E. M. MacAllister

Candidate for B. Eng. in Met.

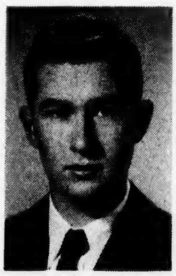
School Address: Douglas Hall, 3851 University St., Montreal, Que.
Home Address: 55 Melrose Ave., Toronto North, Ont.

Age 25, single, veteran. Thesis on Bain S-curve of medium-carbon steel. Experience: 5 months foundry; 4 months sinter plant; 3 months sink-float plant; 3 months ore dressing. Desires steel producing industry. Mideast preferred (Ontario, Quebec, or equivalent). Available Sept.

Kenneth Bruce McCullogh

Candidate for B. Eng. in Met.

School Address: 4620 Marcil Ave., Montreal 28.
Home Address: Same.



Age 22, single. Holds B. Sc. in math., 1949. Beatty scholarship in math., 1945; Department of Mines Scholarship 1950. Thesis on Bain S-curves. Summer employment: 1950—oxygen and acetylene production and welding; 1949—foundry training (openhearth, laboratory, etc.); 1947—research lab in chemical plant. Sales and development work in steel plant desired; Al or Ti producing industry second choice. Eastern Canada or U. S. preferred but not essential. Available June 15.

S. Eric McFall

Candidate for B. Eng. in Met.

School Address: 1308 St. Catherine St., West, Apt. 11, Montreal.
Home Address: Same.

Age 29, married, 1 child. Volunteer Reserve R.C.A.F. Thesis on overheating and burning of steel. Experience: 1 summer on copper-nickel ore beneficiation, 1 summer on steel tubing rolling mill, 2 summers on construction, drafting, etc. Ferrous industry preferred; copper, nickel or zinc second choice. Any location where a home can be established for family. Available May 1.

L. Colin Malabre

Candidate for B. Eng. in Met.

School Address: 2098 Trenholme Ave., Montreal.
Home Address: Same.

Age 28, married, 3 children. Canadian Reserve Army Lieut. Thesis on burning and overheating of S.A.E. 1095 steel. Experience: 5 months in base metal smelter (converting), 5 months electric furnace steel (first helper). First preference is for steel melting shop or heat treating of alloys. Eastern Canada (Quebec or Ontario) is first choice; northeastern U. S. (Baltimore, New York State, Cleveland) second. Available May.

William Sansom

Candidate for B. Eng. in Met.

School Address: 5727 Coolbrooke Ave., N.D.G., Montreal 29, Que.
Home Address: Same.

Age 28, single. Reserve list of officers, Canadian Army. Thesis on S-curves of 1065 steel. Department of Mines Scholarship 1949-50. Essay prize from both Canadian Inst. of Mining and Met. and Engineering Undergraduate Society, 1948; essay prize from *Candian Mining Journal*, 1950. Experience: 2 summers research stainless steel & alloys; 1 summer aluminum production. Desires research, either steels or nonferrous (Ni, Al, Zn). Any location. Available May 1.

Joseph Speidel

Candidate for B. Eng. in Met.

School Address: McGill University.
Home Address: 12 Clonard Ave., Winnipeg.

Age 35, single, veteran. Has attended United College in Winnipeg and Univ. of Manitoba. Business training; speaks German. Member Canadian Inst. Mining and Met., Eng. Inst. of Canada, and Brit. Inst. of Eng. Technology. Summer experience in precious metals refinery, gold mine mill, copper shape casting. Desires work in ferrous industry or copper. Eastern territory preferred. Available June 15.

J. Andre Vezina

Candidate for B. Eng. in Met.

School Address: 2395 St. James St., W., Montreal
Home Address: Same.

Age 29, supplementary reserve, Canadian Army. Senior studies: Met. of iron and steel, extractive met., phys. met., electromet., metallurgical thesis, phys. chem., thermodynamics, mineral dressing. First choice—research in copper industry; second choice, ferrous. Available May.

James Arthur Walsh

Candidate for B. Eng. in Met.

School Address: 22 Ballantyne Ave., S., Montreal West.
Home Address: Same.

Age 26, single, inactive reserve. Senior studies: Met. of iron and steel, extractive met. phys. met., electromet., thesis, phys. chem., chemical thermodynamics. Experience as methods engineer in plastic dept. Interested in athletics, photography, stamps. Desires nonferrous producing industry. Western region preferred. Available June.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Massachusetts Institute of Technology

James Wong

Candidate for Met. Engr.

School Address: M.I.T. Graduate House, Cambridge 39.
Home Address: 63 Bayard St., New York 13, N. Y.

Age 23, single, draft status 2A. M. S. thesis was on surface tension of solid metals. Undergraduate course at M.I.T. in mech. eng.; graduate year in metallurgy. Holds staff scholarship. Two years teaching and research experience at M.I.T. Member Sigma Xi. Would like research or teaching. Any location. Available Sept.

Michigan College of Mining and Technology

Herbert T. Anderson

Candidate for B. S. in Met. Eng.

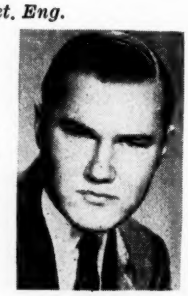
School Address: 200 Vivian St., Houghton, Mich.
Home Address: 1120 Holbrook St., Pontiac 18, Mich.

Age 23, single, draft status 4A. Electives include X-rays, protective coatings, advanced phys. met.; literature research paper on permanent magnets from metal powders. Upper third of class; managing editor of college weekly. Summer experience in foundry sand dept. First choice technical writing; second choice research. East or midwest. Available April.

Donald M. Ashfal

Candidate for B. S. in Met. Eng.

School Address: 125 Lovell Rd., Houghton, Mich.
Home Address: 502 S. Lansing St., Mason, Mich.



Age 23, single, draft status 4A. Interested in ferrous process metallurgy, electrometallurgy, protective coatings, foundry. Desires plant work in producing industry, ferrous or Al or Mg. Midwest preferred but not essential. Available April.

Jack G. Bachand

Candidate for B. S. in Met. Eng.

School Address: P. O. Box 103, Houghton, Mich.
Home Address: 299 S. Carter Rd., Midland, Mich.

Age 25, married, 1 child. Member U.S.A.R. Electives include protective coatings, advanced phys. met., machine shop, business law, mineralogy, mining. Undergrad. problem: Cupola air blast control. Experience as lab. technician at glass company for 1½ years; laborer on construction crew for 3 months. First choice ferrous producing industry. Midwest preferred. Available April 15.

Jack C. Brodsky

Candidate for B. S. in Met. Eng.

School Address: 100 Montezuma, Houghton, Mich.
Home Address: 10 Belmont Ave., Brooklyn, N. Y.

Age 28, single, above draft age. Has also attended Brooklyn College and New Mexico School of Mines. Electives include X-rays, principles of furnace design, process met. Summer experiences at Bunkerhill & Sullivan Mining & Concentrating Co.; also 1½ years in production of sheet metal acoustical ceilings. First choice ferrous research; second choice producing industry. East Coast from New England south preferred; midwest (industrial triangle) second choice. Available July.

Kenneth A. Burnett

Candidate for B. S. in Met. Eng.

School Address: 308 Bourgeois Lane, Woodmar, Houghton, Mich.
Home Address: 1819 Fairview St., Birmingham, Mich.

Age 23, married, no children. Draft status 4A. Special subjects: Phys. met. (ferrous and nonferrous), protective coatings. Literature report on surface carbon restoration during heat treatment of steel. Desires work in fabrication of copper, aluminum or magnesium. Detroit preferred. Available June 18.

Edward F. Crimmins

Candidate for B. S. in Met. Eng.

School Address: Box 314, Hubbell, Mich.
Home Address: 1203 Court St., Port Huron, Mich.

Age 28, married, 3 children. Special subjects: X-rays, powder metallurgy, foundry, applied heat treatment, pattern shop, alloy steels, physical chemistry. Literature research on foundry sand control. Three summers' experience in copper smelters, as chipper in gray iron foundry, and in steel heat treating dept., respectively. Desires work in gray iron foundry. Midwest area, preferably Michigan. Available April 1.

Arthur Ronald Flasck

Candidate for B. S. in Met. Eng.

School Address: Box 447, Hubbell, Mich.
Home Address: 12550 Chelsea, Detroit 5, Mich.

Age 21, married, 1 child. Not classified for draft. Electives include electroplating, porcelain enameling, dilatometry, advanced physics of metals. Graduating with honors, Detroit high school scholarship. Experience in welding, tool crib, and as student assistant at Michigan Tech. Work with unskilled, skilled and technical men has given first-hand contact with many human relations problems. Would like sales position or industrial work. Any location. Available March 22.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Michigan Tech (Cont.)

Karl William Hansen

Candidate for B. S. in Met. Eng.

School Address: Box 55, Lake Linden, Mich.
Home Address: Same.

Age 21, single, draft status ID (R.O.T.C.). Term reports on protective atmospheres for heat treatment of steel and on factors affecting coke consumption in iron blast furnace. Summer experience in blast furnace sintering plant and general labor. Michigan high school scholarship and Distinguished Military Student, Tribune Medal. Work on student publication; honorary fraternities. Desires ferrous producing industry or industrial work. Midwest preferred but not essential. Available Aug. 15.

Richard William Hanzel

Candidate for B. S. and M. S.

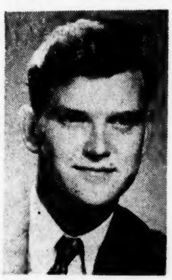
School Address: Rm. 314 Douglass Houghton Hall, Houghton, Mich.
Home Address: 2809 S. St. Louis Ave., Chicago 23, Ill.

Age 26, single, 2nd Lieut. inactive reserves. Master's thesis on inoculants for nodular cast iron. Special studies include phys. met., X-rays, special alloy steels, furnace design, foundry and pyromet. practice, engineering administration. Member of honorary fraternities; Distinguished Military student. First choice foundry position working on nodular cast iron. Territory in or reasonably near Chicago preferred. Available July.

James C. Herr

Candidate for B. S. in Met. Eng.

School Address: 302 Bourgeois Lane, Woodmar, Houghton, Mich.
Home Address: 58 Frisbie, Battle Creek, Mich.



Age 22, married. Draft status 4A. Studies include electrometallurgy and protective coatings, phys. met., alloy steels, X-rays, pyrometry, production met., furnace design, engineering administration. Active in public speaking, athletics. Experience as laboratory assistant, Kellogg Co., and color chemist for International Printing Ink. First choice consuming industry. Midwest area. Available April 1.

Charles O. Hlavacek

Candidate for B. S. in Met. Eng.

School Address: 218 Blanche St., Houghton, Mich.
Home Address: 1151 S. Kenilworth Ave., Oak Park, Ill.

Age 23, single, draft status 4A. Special studies and electives include foundry, met. calculations and mixtures, electrometallurgy, protective coatings, applied X-rays. President of social fraternity for one year. Experience Sept. 46 to Sept. 47 with Western Foundry Co. on chem. and phys. analysis of iron and steel castings, testing of foundry sands, and general foundry operating procedure. Primarily interested in production of iron and steel castings or forgings. Chicago area preferred. Available April.

William M. Justusson

Candidate for B. S. in Met. Eng.

School Address: 109 E. South St., Houghton, Mich.
Home Address: 127 Rowe St., Ironwood, Mich.

Age 20, married, no children. Draft status 3A. Electives include advanced phys. met., protective coatings, transitometry. As student lab. assistant at Michigan tech, tested and did research on foundry sands, helped build a 10-in. cupola and helped operate the cupola. Interested in ferrous industrial or research work; second choice copper. East or midwest preferred. Available March 22.

Virgil J. Knierim

Candidate for B. S. and M. S.

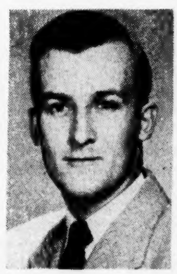
School Address: 210 Clements Circle, Houghton, Mich.
Home Address: 517 Bristol St., Adrian, Mich.

Age 26, married, 1 child, veteran. Has attended Adrian College and Texas A & M. Electives include powder metallurgy, metallographic technique, X-rays, physics of metals, instrumentation and control. Thesis on Croning molding process. Experience as plater-helper part-time 1 year; production worker on refrigeration compressors part-time and summer full time 1½ years. Would like research work in foundry on Al, Mg, or high-temperature alloys. Any location. Available June 17.

Arnold E. Nilsen

Candidate for B.S and M.S.

School Address: 100 Montezuma St., Houghton, Mich.
Home Address: 4 Grandview Terr., Hartford 6, Conn.



Age 26, single, draft status 4A. Especially qualified in phys. met., bus. admin., X-rays, phys. chem., furnace design. Master subjects: applied X-rays, powder met., adv. phys. met., Thesis: Notch-tensile strength and heat fatigue of Inconel-X. Experience as met. lab. technician; milling machine and drill press operator. Vice-pres. honorary fraternity; sec-treas. A.S.M. chapter. Would like research in Ni-Cr high-temperature alloys. New England or Northeast preferred. Available April 15.

Howard R. Palmer

Candidate for B. S. in Met. Eng.

School Address: 428 Lovell Rd., Houghton, Mich.
Home Address: 73 Elm St., Geneva, N. Y.

Age 25, married, 2 children. U.S.N.R., V-6. Has attended Associated Colleges of Upper New York, Sampson Campus. Courses include nonferrous production met., iron and steel met., pyrometry and instrumentation, electrometallurgy, physical met., copper smelting and refining, foundry, pyrometallurgy, furnace design, applied heat treat, protective coatings, X-rays, alloy steels, met. calculations. Desires research or consuming industry, preferably in production control. Anywhere in U. S. Available June 16.

Michigan Tech (Cont.)

Kenneth Pinnow

Candidate for B. S. in Met. Eng.

School Address: 218 Blanche St., Houghton, Mich.
Home Address: 237 S. Summit Ave., Villa Park, Ill.

Age 22, single. Draft status 4A. Elective courses include applied X-rays, protective coatings, powder metallurgy. Member Tau Beta Pi and other honoraries; corresponding secretary of honorary met. fraternity. Three months experience as heat treater in commercial heat treating plant. Desires industrial plant or research, either ferrous or aluminum or titanium. No regional preference. Available April 1.

Benjamin R. Rajala

Candidate for B. S. in Met. Eng.

School Address: 400 Garnet St., Houghton, Mich.
Home Address: R. F. D. Rte. 2, Box 100, Ironwood, Mich.

Age 24, single. Draft status 4A. Courses include physical metallurgy, met. calculations, refractories, foundry, pyrometry, furnace design, physical chemistry, electrochemistry, iron and steel refining, alloy steels, heat treatment, protective coatings (elective). Desires ferrous industrial work or producing industry. Midwest region. Available April 2.

W. Keith Rogers

Candidate for B. S. in Met. Eng.

School Address: 333 Miller Rd., Houghton, Mich.
Home Address: 338 Mitchell Ave., Negaunee, Mich.

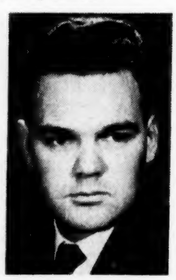
Age 23, married, no children. Draft status 4A. Attended Northern Mich. College of Education. Courses include process metallurgy, physical met., electrometallurgy, copper smelting, foundry, pyrometallurgy, alloy steels, furnace design, heat treatment. Electives: X-rays, adv. physical met., research problem on Croning casting process. Desires research or industrial plant, either ferrous, or aluminum or copper. Midwest. Available March 23.

Boyd F. Tait

Candidate for B. S. in Met. Eng.

School Address: 223 Blanche St., Houghton, Mich.
Home Address: 370 West Grant St., Caro, Mich.

Age 23, single. Courses include process metallurgy, physical met., electrometallurgy, protective coatings, alloy steels, met. calculations, furnace design. Summer experience primarily in casting and treating of castings, cleaning, heat treating and testing. Metallurgical research paper on die casting of magnesium. Desires producing industry, research or sales, preferably magnesium or aluminum. Midwest. Available March.



John J. Vitton, Jr.

Candidate for B. S. in Met.

School Address: Box 636, Lake Linden, Mich.
Home Address: Same.

Age 20, single. Draft status 1A. Courses include foundry, pyrometry, electrometallurgy, alloy steel, furnace design, heat treatment, protective coatings, X-rays. Summer experience as chemical lab assistant in drop forge company, observer in steel company. Public speaking; athletics. Desires ferrous producing industry or manufacturing plant. Anywhere in U. S. Available June 20.

Zygfried R. Wolanski

Candidate for B. S. in Met. Eng.

School Address: 218 Blanche St., Houghton, Mich.
Home Address: 8105 Marcus St., Detroit 13, Mich.

Age 23, single. Veteran, draft status 4C. Courses include physical metallurgy, pyrometry, alloy steels, applied heat treatment, powder metallurgy, X-rays. Photography editor of yearbook. Desires quality control work or research, ferrous metals. Midwest region preferred. Available March 30.

Fred J. Zeglen

Candidate for B. S. in Met. Eng.

School Address: 1301 Ruby St., Houghton, Mich.
Home Address: 5259 Maple, Dearborn, Mich.

Age 26, single. Veteran, draft status 5A. Attended Wayne University; pre-eng. degree from Dearborn Junior College. Especially qualified in ferrous metallurgy. Electives include advanced physical metallurgy, protective coatings. Honorary fraternity. Experience as machinist (mill and shaper operator), tool and die apprentice. Desires industrial work or research in ferrous metals; brass is second choice. Midwest area, preferably Detroit. Available April.

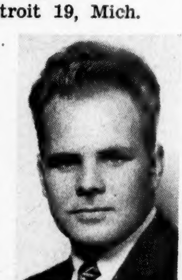
Michigan State College

Darwin E. Grote

Candidate for B. S. Degree

School Address: 410 Grove St., E. Lansing, Mich.
Home Address: 18784 Glenhurst, Detroit 19, Mich.

Age 27, married, 3 children. Member of organized reserve. Courses include physical metallurgy, chemistry, thermodynamics, modern physics, foundry metallurgy. Vice-president of Engineering Council. Experience: 18 months as screw machinist; 12 months as assistant chief draftsman in steel fabricating company; summer employment with commercial steel treater. Desires research or producing industry, ferrous metals, aluminum or copper. Detroit area preferred. Available July.



Michigan State (Cont.)

James House

Candidate for B. S. in Met. Eng.

School Address: 805 C Maple Lane, E. Lansing, Mich.
Home Address: 212 N. Warren Ave., Big Rapids, Mich.

Age 25, married, no children. Air Force O.R.C. Holds B.S. in Chemical Eng. Thesis subject: relationship of acicular ferrite and upper bainite. Courses include theoretical metallurgy, physical metallurgy, powder metallurgy, heat treat practice and control. Dean's List three terms; honorary fraternity. Employed two summers by research and testing division of State Highway Dept. Desires industrial, research or development work. Michigan or Midwest preferred. Available June 11.

Richard Thomas Jeffreys

Candidate for B. S. in Met. Eng.

School Address: 800 N. Walnut, Lansing, Mich.
Home Address: Same.

Age 24, single. Veteran, draft status 1A. Elective courses include powder metallurgy, advanced physical metallurgy, heat treating practice and control. Secretary-treasurer of local A.S.M. student chapter; member A.F.S. Summer work in heat treat division at Lansing Oldsmobile. Desires sales or industrial work, ferrous metals. Midwest preferred. Available June 15.

Alfred R. Karow

Candidate for B. S. in Met. Eng.

School Address: 810-C, Cherry Lane, E. Lansing, Mich.
Home Address: 1827 Newberry St., Saginaw, Mich.

Age 30, married, no children. Draft status 1C. Courses include physical metallurgy, pyrometry, lab methods, extractive metallurgy, powder metallurgy, physical chemistry, heat treating, thermodynamics, electrodeposition, spectroscopy. Upper quarter of class; honorary fraternities. Flight engineer, U.S.A.A.F., 1942-45. Experience in malleable iron plant: clerical, 1938-42; metallurgical lab and heat treating, 1945-47. Desires producing industry or research. Midwest. Available June 15.

Ernest T. Nicotera

Candidate for B. S. in Met. Eng.

School Address: 101 Woodmere, E. Lansing, Mich.
Home Address: 273 S. Second St., Steelton, Pa.

Age 26, single, veteran. Attended Harrisburg Area College (Penn State Center). Courses include physical chemistry, physical metallurgy, heat treatment, powder metallurgy, foundry, atomic physics, thermodynamics. Student publications, fraternity treasurer. Summer work as millwright helper at steel company. Desires development work or producing industry, aluminum or copper. East preferred but not essential. Available now.

John F. Richards

Candidate for B. S. in Met. Eng.

School Address: 429 Hawthorne Lane, E. Lansing, Mich.
Home Address: 3192 Eaton Rapids Rd., Lansing, Mich.

Age 27, married, no children. Attended University of Wisconsin. Courses include ferrous and nonferrous physical metallurgy, physical chemistry, pyrometry, motion and time study, job evaluation. Worked in college laboratory. Desires research or producing industry. Anywhere except south. Available July.

Richard R. Studor

Candidate for B. S. in Met. Eng.

School Address: 907-A Maple Lane, E. Lansing, Mich.
Home Address: 604 Peet Rd., Chesaning, Mich.

Age 33, married, 1 child. Reserve Officer. Courses include cast ferrous metallurgy, foundry technology and eng., production met., phys. met., electrodeposition, spectroscopy, atomic physics. F.E.F. Scholarship; Dean's List; Tau Beta Pi. Two summers' work in gray and malleable iron foundry; one summer, forge plant. Desires consuming industry or sales to foundry industry. Ferrous metals preferred; Al and Mg next. Mountain states, midwest or west coast; city of 500,000 or less preferred. Available July 1.

University of Michigan

Owen S. Breidinger

Candidate for B. S. in Met. Eng.

School Address: 1601 Munson Court, Willow Run, Mich.
Home Address: Ithaca, Mich.

Age 28, married, 1 child. Veteran, draft status 5A. Courses in physical metallurgy, unit operations, foundry, thermodynamics, physical chemistry, met. design. Summer and part-time employment in automobile industry, and work as millwright prior to entering the Army. Desires producing industry or industrial plant, ferrous metals. Midwest preferred but not essential. Available June 15.

Albert William Demmler, Jr.

Candidate for B. S. in Met. Eng. and M. S.

School Address: 212 Strauss House, East Quadrangle, Ann Arbor, Mich.
Home Address: 2931 E. Judson Rd., R.F.D. #1, Spring Lake, Mich.

Age 22, single. Draft status 1A. Holds Bachelor of Philosophy, College of Univ. of Chicago. Majors for Master's will be in process and physical metallurgy. Member of Tau Beta Pi. Student assistant in physical met. lab at Michigan. One summer's work in heat treat department of gray iron foundry as castings handler, furnace operator, grinder, etc. Desires industrial plant or producing industry, ferrous metals. East or midwest. Will get B.S. in June, M.S. in Feb. 1952.

Raymond J. Hibbeln

Candidate for M. S. E. (Metallurgy)

School Address: 1416 Hanover Ct., Willow Run, Mich.
Home Address: Same.

Age 25, married. Inactive Reserve. B.S., Mich. Col. of Mining and Tech., 1948. Graduate courses include corrosion and high-temperature metallurgy, met. operations, nonferrous phys. met., cast iron and steel, alloy steels, furnace design, machinability. Michigan high school scholarship. Experience: 18 months in met. lab, after B.S. degree; 9 months on high-temperature research at University. Producing industry, first choice. Midwest, preferably Mich., Ill., or Wis. Available July 6.

Rudolph Jackowski

Candidate for B. S. in Met. Eng.

School Address: 1414 Hanover Ct., Willow Run, Mich.
Home Address: Same.

Age 31, married, 2 children. Attended Alliance College and Syracuse University. Courses include engineering materials and processes, cast metals, structure of solids, met. process design, X-ray studies, phys. met., engineering operations. Experience: 1½ years (full time summers, half time during semesters) as lab assistant in high-temperature research; lab assistant in foundry for 9 months. Desires ferrous producing industry or research. Any location. Available July 1.

Alfred S. Keh

Candidate for Ph. D. Degree

Present Address: 931 Greenwood, Ann Arbor, Mich.

Age 23, single. B.S. in Mech. Eng. 1948, National Chiao-Tung Univ., China; M.S.E. in Ind. Met. Eng. Studies include physical met., structure of solids, X-ray, thermodynamics, alloy steels, high-temperature met., nonferrous met., unit operations, machinability, parts processing. Desires general training in ferrous production, fabrication or treatment. Any location. Available July; wants to get some practical experience before finishing Ph.D. degree.

Maxwell D. Kiessling

Candidate for B. S. in Met. Eng.

School Address: 417 S. Division St., Ann Arbor, Mich.
Home Address: Same.

Age 24, married, 1 child. Draft status 3A. Attended Marshall College. Courses include thermodynamics, unit operations, structure of solids, metallurgical process design, design of equipment, X-ray, physical metallurgy, engineering operations, foundry, measurements lab. Summer work in steel forming plant. Desires ferrous producing industry or industrial plant; aluminum second choice. East or midwest preferred but not essential. Available Sept. 1.

Univ. of Michigan (Cont.)

Vernon Pryer

Candidate for M. S. E. in Met. Eng.

School Address: 901 Packard St., Ann Arbor, Mich.
Home Address: R. R. #1, Nunica, Mich.

Age 36, single. Attended Detroit Inst. of Technology 1943-45, and M.I.T. 1945-47; B.S. in Met. Eng., Michigan, Feb. 1950. Special investigations on cooling rates of cast iron in sand molds, isothermal transformation and creep of a medium alloy steel. $100 scholarship at M.I.T. Two summers experience in gray iron foundries; assistant to prof.; employed by Eng. Research to run high-temp. fatigue tests on springs. Desires industrial plant. Midwest or west. Available now.

Raymond Bradley Roof, Jr.

Candidate for B. S. in Chem. Eng. and B. S. in Met. Eng.

School Address: 1319 Cambridge Rd., Ann Arbor, Mich.
Home Address: 149 College St., Battle Creek, Mich.

Age 21, single. Draft status 1A. Courses in structure of solids and X-rays, physical metallurgy, operations and cast metals, design; education courses are electives. Military scholarship; Distinguished Military Student. Lab assistant in chemistry at Michigan, three years. Experience includes physical science aid, ordnance, ballistics research. Desires teaching or producing industry, ferrous metals. Eastern U. S. Available Feb. 1952 or later; desires to work for higher degrees.

Robert D. Schelleng

Candidate for B. S. in Met. Eng.

School Address: 1319 Cambridge Rd., Ann Arbor, Mich.
Home Address: 18 Draper St., Oneonta, N. Y.

Age 25, single. Draft status 4A. Thesis on fracture test for melt quality of copper alloys. Electives include powder metallurgy, cast iron and steel, metals at high temperatures, alloy steels, physical metallurgy and met. operations. Research fellowship. Desires research or consuming industry; ferrous metals, aluminum, brass and bronze, or titanium, in that order. Eastern location. Available Sept.

H. Jack Siekmann

Candidate for Master's in Bus. Administration

School Address: 1319 Cambridge Rd., Ann Arbor, Mich.
Home Address: 2974 Douglas Terrace, Cincinnati 13, Ohio.

Age 26, single. Draft status 5A. Met. Engr. degree, Univ. of Cincinnati. Courses include phys. met., operations, microscopy and X-rays, electrometallurgy, plant design, specifications, processes. Major graduate studies in sales and management. Co-op. work in metal coatings dept. of steel mill, testing and research lab, machinability testing, univ. lab assistant, chemical production distillation. Desires sales engineering, ferrous metals (preferably) or Al, Mg or Ti. Any location. Available June.

Univ. of Michigan (Cont.)

Yeshwant P. Telang

Candidate for M. S. E. in Met. Eng.

School Address: 1017 Oakland Ave., Ann Arbor, Mich.
Home Address: Bombay, India.

Age 25, single. B.S. (geology and chem.), Univ. of Bombay, 1947; B.S. in Chem. Eng. and B.S. in Met. Eng., Univ. of Mich. Courses include powder met., heat and corrosion resistant steels, isothermal transformation of alloy cast iron, rolling, forging, extrusion, drawing. Research asst. to prof. in foundry labs, on fracture test for melt quality of brass and bronze, production of nodular iron. Desires research or extraction and fabrication of ferrous metals, brass and bronze, or Al. Any location. Available March 1951.

George C. Towe

Candidate for Ph. D. Degree

School Address: 411 W. Davis Ave., Ann Arbor, Mich.
Home Address: Same.

Age 29, married, 1 child. U.S.N.R. Thesis on microphase studies in high-temperature alloys. Essentially a chemist, but doctoral problem has led to extensive interest in physical chemistry and analytical methods for metals. Member Sigma Xi. Extensive public speaking courses. Three years at Naval Ordnance Lab as physicist; 3½ years in anal. chem. lab (2 years head of lab) at Michigan Eng. Res. Inst. Desires research or industrial. No geographical preference. Available sometime in 1951.

John J. Villa

Candidate for B. S. E. in Met.

School Address: 1369 Sudbury Ct., Willow Run, Mich.
Home Address: 7275 Whittaker St., Detroit 9, Mich.

Age 33, married, 1 child, veteran. Courses include physical chemistry and thermodynamics, physical metallurgy, foundry, X-ray studies, met. process design, design of equipment, unit operations. Experience as tool and die apprentice, 3½ years; journeyman toolmaker, 5½ years. Desires ferrous producing industry or industrial plant. Midwest (Detroit) preferred but not essential. Available Sept.

Elmer E. Weismantel

Candidate for B. S. in Met. Eng.

School Address: 921 East Heath Ct., Willow Run, Mich.
Home Address: Same.

Age 25, married, 1 child. Veteran, not reserve. Attended Texas College of Mines and Met. Special studies include metal casting, structure of solids, applied energy conversion, economics, personnel relations, in addition to prescribed courses. Active in public speaking. Eighteen months experience in research lab. working on protective coatings and corrosion. Desires producing industry or industrial plant, ferrous metals. South or east preference. Available June 18.

University of Minnesota

John W. Ferman

Candidate for B. S. in Met. Eng.

School Address: P. O. 10058, U. of M., Minneapolis 14.
Home Address: 613 E. 50th St., South, Minneapolis 17.

Age 22, single. Draft status 1A. Courses include metallography; refractories, blast furnace and open-hearth; electrometallurgy; nonferrous met.; physical chem.; mineral dressing. Electives are mineralogy, petrography, and special problems (analysis of failed parts, X-ray metallography). Would like producing industry or research, but no great preference. Midwest. Available Sept.

John R. Holmberg

Candidate for B. S. in Met.

School Address: 1421 W. Minnehaha Ave., St. Paul 4.
Home Address: Same.

Age 24, married, no children. Draft status 1C. Courses include metallography, steel metallurgy, blast furnace, nonferrous met., physical chemistry. Member of two student activity committees. Experience with Ford Motor Co., Minnesota Mining and Mfg. Co., Seeger Refrigerator Co. Desires production research, ferrous metals. Midwest preferred but not essential. Available June 15.

William Anthony Koppi

Candidate for B. S. in Met. Eng.

School Address: 2546 14th Ave., South, Minneapolis, Minn.
Home Address: Same.

Age 26, single. Organized Reserve; Metalsmith 1/c. Electives include advanced foundry control, advanced molding methods, X-ray analysis. Member of A.F.S. Experience as heat treating furnace tender, foundry laborer, lab assistant in mineral dressing. Desires producing industry or industrial plant, preferably ferrous. Northwest territory, preferably Minneapolis. Available July 1.

Missouri School of Mines

George P. Bollwerk, Jr.

Candidate for B. S. in Met.

School Address: 1107 State St., Rolla.
Home Address: 3524 Kingsland Ct., St. Louis, Mo.

Age 22, single. 2nd Lieut. in Engineers Corps. Electives include industrial hygiene and safety, thermodynamics, radiography, adv. metallurgy, heat. Summer job as plant laborer for chemical company. Would like work in ore dressing; copper, lead or zinc. Any location. Available now.

Missouri (Cont.)

Melvin A. Buettner

Candidate for B. S. in Met.

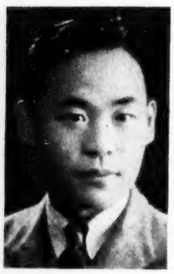
School Address: 206 W. Ninth St., Rolla, Mo.
Home Address: 412 Monroe, St. Charles, Mo.

Age 21, single. Draft status 2A. Courses include physical chemistry, physical metallurgy, mineral dressing, foundry engineering. Regional vice-president of fraternity. Summer work as engineering trainee in propulsion and Helicopter division of aircraft company. Desires sales engineering or producing industry; copper, lead or zinc. Midwest or west. Available June 15.

John Weikung Chang

Candidate for M. S. Degree

Address Until May 1951: P. O. Box 5191, Phoenix, Ariz.
Home Address: 1400 Broadway, San Francisco, Calif.

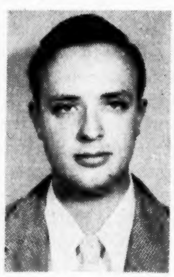


Age 32, married, 4 children, all in China. Subject of thesis: Study of single crystal of copper by powder met. methods. Especially interested in physical metallurgy. Worked as assistant in metallurgy department. Desires research or industrial work, preferably producing industry. Any location. Available now.

Edwin Elliott, Jr.

Candidate for B. S. Degree

School Address: MSM Dormitory, Rm. 108, Rolla, Mo.
Home Address: #4 Box 373 AA, Rockford, Ill.



Age 23, single. Draft status 1A. Attended Northwestern University. Courses include physical metallurgy, mineral dressing, foundry engineering, process metallurgy, met. calculations, electrometallurgy. Foundry apprentice in Northwestern work-study plan. Two months as detailer in a drafting room; 1½ years as a chrome plater. Desires industrial or research work, preferabley titanium. Midwest; Rockford, Ill., preferred. Available June 7.

Thomas Royston Evans

Candidate for B. S. in Met.

School Address: MSM Apt. Q-4, Rolla, Mo.
Home Address: 216 East 9th St., Baxter Springs, Kans.

Age 28, married, 2 children. Electives include process metallurgy, electrometallurgy, X-rays, refractories. On honor list throughout school; member Tau Beta Pi. Speaks French and German; lived in England for 20 years. Experience in England as mech. draftsman for tin-plate company, and lab technician for oil refineries; in U. S. as roustabout for Pb-Zn mines, and research aid in refining of titanium, also chemical analyst. Desires sales, preferably producing industry. Wants work in U. S. A. Available June.

Missouri (Cont.)

Robert E. Riley, Sr.

Candidate for B. S. Degree

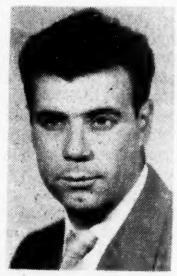
School Address: 607 E. 10th St., Rolla, Mo.
Home Address: Same.

Age 26, married, 1 child. Veteran, draft status 4A. Electives are X-ray diffraction analysis and radiography. Has 10 hr. of physical metallurgy and 9 hr. physical chemistry in addition to required courses. Desires research or teaching. East, preferably Pennsylvania. Available June 15.

James Salmas

Candidate for B. S. in Met.

School Address: 204 W. 18th St., Rolla, Mo.
Home Address: 152 Broadway, Haverhill, Mass.



Age 25, single. Draft status 4A. Attended Worcester Jr. College (1947-48) and Northeastern University (1948-49). Courses include principles of metallurgy, mineral dressing, process met., metals and alloys, physical met., foundry, electrometallurgy, met. calculations. Foundry Educational Foundation Scholarship. Two years experience in machine shop on all machines; 2 months in foundry. Desires research, preferably in ferrous producing industry. Eastern location. Available July.

Sheng-tai Shih

Candidate for M. Sc. Degree

School Address: 1306 Pine St., Rolla, Mo.
Home Address: Wuchang, China.

Age 33, married, 1 child. B. S. in Met. Eng., National Wuhan University, China, 1945. Teaching assistant, same place, 1946-49. Holds Li Foundation Fellowship. Subject of thesis: volatility and desulfurization of titanium disulfide in vacuum. Desires research in iron and steel. Available now.

George William Sullivan

Candidate for B. S. in Met.

School Address: MSM Apt. P-2, Rolla, Mo.
Home Address: RR #1, Box 270-A, Webb City, Mo.

Age 28, married, 1 child. Draft status 5A. Is Associate in Science. Studies include special problems in steels, high-temperature reactions, refractories and electrical engineering, in addition to prescribed courses. Foundry Educational Foundation Scholarship. Chairman of local A.F.S. Experience: 2 years as control chemist and 4 years as production metallurgist for acid electric steel foundry. Desires steel foundry or ferrous producing industry. No regional preference. Available June.

Missouri (Cont.)

Raymond Clark Wiley
Candidate for B. S. in Met. Eng.

School Address: 403 E 11th St., Rolla, Mo.
Home Address: 717 Richmond Ave., Silver Springs, Md.

Age 25, single. Veteran, not in reserves. Courses include physical metallurgy and physical chemistry, mineral dressing, process metallurgy, electrometallurgy, met. calculations, advanced metallurgy. Graduated Navy Class A—Fire Control Electronics School. Summer work in steel plant control analysis lab. Desires producing industry, preferably ferrous. Eastern location. Available now.

Wade C. Wurtz
Candidate for B. S. in Met.

School Address: 208 W. 11th St., Rolla, Mo.
Home Address: 746 N. 74th St., East St. Louis, Mo.

Age 36, married, 1 child. Veteran. Electives include physical metallurgy, mineral dressing, foundry engineering, radiography, adv. metallurgical problems. Foundry Educational Foundation Scholarship. Experience in steel foundry, production control and metallurgical lab, 1938 to 1947, with 42 months interruption for military service in Navy. Desires industrial work in ferrous metals. No regional preference. Available June 1.

University of Notre Dame

William F. Carew
Candidate for B. S. in Met. Eng.

School Address: 335 Dillon Hall, Notre Dame, Ind.
Home Address: 5911 North Rockwell St., Chicago 45, Ill.

Age 21. Single. Draft status 1-A. Courses include principles of mineral dressing, phase diagrams, phys. metallurgy, seminar in metallurgy. Worked part-time in metallurgy laboratory at college on eutectics for use in course on phase diagrams. Worked summers in plastics foundry, operating compression mold, and as new car inspector. Prefers industrial work or producing industry; ferrous metals or aluminum. Midwest preferred. Available June 10.

Eugene E. Hoffman
Candidate for B. S. in Met. Eng.

School Address: 309 W. Navarre, South Bend, Ind.
Home Address: 1024 N. Main St., Henderson, Ky.

Age 23. Single. Veteran. Courses include mineral dressing, extractive met., phase diagrams, physical metallurgy, physics of metals, seminar in metallurgy, management of manpower. Metallurgy Club president; Student Engineering Advisory Board. Worked as laboratory assistant 1 year, and 5 semesters in metallurgy lab at school. Desires research or producing industry, either ferrous or nonferrous, preferably titanium. Midwest or east. Available June 11.

Notre Dame (Cont.)

Thomas F. Moormann
Candidate for B. S. in Met.

School Address: 256 Dillon Hall, Notre Dame, Ind.
Home Address: 8734 Huntington Rd., Huntington Woods, Mich.

Age 22. Single. 1-A draft status. Courses include phase diagrams, mechanical testing of metals, physical chemistry, extractive metallurgy, physical metallurgy, German technical reading, physics and nuclear physics. Summer work: foundry core making; chemical analysis. Desires producing industry or plant work with ferrous metals (steel or cast iron). Midwest preferred but not essential. Available June 15.

Ohio State University

Charles R. Benson
Candidate for B. Met., M. Sc. Degrees

School Address: 2085 Peasley St., Columbus, Ohio.
Home Address: 230 S. Lincoln St., Kent, Ohio.

Age 26. Single. Veteran. Courses include physical met., physical chemistry, thermodynamics, corrosion. Master Thesis: beneficiation of a British Guiana bauxite ore. Tau Beta Pi and other honorary societies. Attended Kent State University. Worked summers as helper on openhearth and in blast furnace chemistry lab. Desires research and development or quality control in nonferrous producing industry (aluminum, magnesium). East or midwest preference. Available June 15.

Paul A. Lockwood
Candidate for B. Met. Eng.

School Address: 137 N. Roys Ave., Columbus, Ohio.
Home Address: Same.

Age 23. Married, 1 child. 3-A draft status. Two years in Ohio State College of Arts and Sciences. Courses include ore dressing, fuels, process metallurgy, titanium production, sintering of ores, and mining techniques. Summer work in mining and ore dressing mill. Prefers producing industry or research, ferrous or nonferrous. Northern states preferred. Available March 19.

Richard D. Rhoney
Candidate for M. Sc. in Met., B. Met. Eng.

School Address: 98 East 14th Ave., Columbus, Ohio.
Home Address: 17409 Flamingo Ave., Cleveland, Ohio.

Age 24. Married. Veteran. Courses include thermodynamics, corrosion of metals and alloys, adv. physical met., cast metals, mech. met., light metals production, construction, fuels, ore dressing, phys. chem. Thesis: alloy cast iron development. Experience as research assistant on alloy gray cast iron project, 1949-51. Summer work in gray iron foundry, steel fabricating plant, aluminum radiography lab. and sand foundry. Prefers research or industrial work with ferrous metals. Midwest or east. Available June 11.

Ohio State (Cont.)

Edward T. Young

School Address: 337 E. 13th Ave., Columbus, Ohio.
Home Address: Same.

Age 26. Married, 1 child. 4-A draft status. Holds B. S. in Chem. and Eng. (Met. minor) Antioch College. Courses include physical met., corrosion, foundry casting control and methods, heat treating of castings, melting methods. Will complete 1 year graduate work in June. Member A.F.S. Lit. research on spectrographic analysis; lab research on thermal fatigue of Al alloy. Experience in testing and production of cast iron, plaster molding of Al, college lab. asst., industrial engineering. Desires producing industry, cast iron, Al or Cu. Any location. Available June 15.

Pennsylvania State College

James H. Black

Candidate for B. S. in Met.

School Address: The Beaver House, State College, Pa.
Home Address: 1006½ 5th Ave., Ford City, Pa.

Age 21. Single. 1 year Catholic Univ. of Amer. Courses include chem. metallurgy, nonferrous, physical and ferrous metallurgy, metallography, steelmaking, foundry and welding, industrial organization and admin., personnel administration. Worked summers in large industrial plant. Prefers industrial, producing industry or development, ferrous metals or Al, Cu, or Mg. No territory preference. Available June.

Edwin F. Eiswerth

Candidate for B. S. Degree

School Address: Hamilton Hall, Rm. #137, State College, Pa.
Home Address: 414 Percy St., S. Williamsport, Pa.

Age 25. Single. Lt. (jg), U.S.N.R. Attended Penn. Maritime Academy, Mansfield State Teachers College. Courses include chemical, nonferrous, physical, ferrous and experimental metallurgy, advanced physical and chemical metallurgy, metallography, metallurgical engineering. One year student research assistant. Prefers research, producing or consuming industry; aluminum or copper. Pacific northwest or New England preferred but not essential. Available June 15.

Donald L. Freyberger

Candidate for B. S. in Met.

School Address: Box 1110 Thompson Hall, State College, Pa.
Home Address: 438 Schuylkill Ave., Reading, Pa.

Age 32. Married. Attended Albright College. Courses include physical chemistry, ferrous and nonferrous metallurgy, structure of alloys, metallurgical investigations, physical metallurgy, foundry practice. Two years' experience as draftsman. Prefers producing industry or industrial work with ferrous metals. East location preferred but not essential. Available June 15.

Richard H. Haupt

Candidate for B. S. in Met.

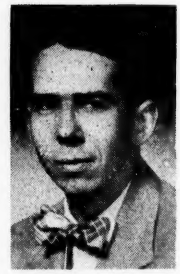
School Address: 318 Windcrest, State College, Pa.
Home Address: 323 12th Ave., Juniata, Altoona, Pa.

Age 25. Married, 1 child. Veteran. Courses include ferrous and nonferrous metallurgy, physical metallurgy, physical chemistry, mechanical testing of materials, mechanics, mineral preparation, advanced physical and ferrous metallurgy. Experience: 18 months in anti-corrosion work, summers as boiler house attendant, vending-machine maintenance and repairs. Prefers producing industry or industrial work with brass or aluminum; ferrous metals second choice. Midwest preferred but not essential. Available June 16.

Donald G. Hazlett

Candidate for B. S. in Met.

School Address: 139 S. McAllister St., State College, Pa.
Home Address: 17 Clinton St., Loyalhanna, Pa.



Age 23. Married. 4-A status, veteran. Attended St. Vincent College. Courses include chemical, physical, ferrous and nonferrous metallurgy, metallography, adv. physical and chemical metallurgy, differential and partial differential equations, physical chemistry. Worked summers as laborer in toolsteel plant and in metallurgical lab. Prefers research work in ferrous metals (powdered steel). Pennsylvania location preferred. Available June 12.

William Joseph Hinkelman

Candidate for B. S. in Met.

School Address: 136 High St., State College, Pa.
Home Address: 115 Huffman Ave., Williamsport, Pa.

Age 24. Married. 3-A draft status. Attended U. S. Merchant Marine Academy; Lycoming College. Courses include chemical, physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, metallurgical engineering and investigations. Summer work in chemical analysis of gray cast iron, physical testing. Employed 8 months as met. lab. assistant. Desires industrial or producing industry, nonferrous preferably. West preferred but not essential. Available July 1.

Howard C. Karr

Candidate for B. S. in Met. Eng.

School Address: 134 N. Prospect St., State College, Pa.
Home Address: 632 Prindle St., Sharon, Pa.

Age 27. Married. 5-A draft status. Courses include physical chemistry, chemical, physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, metallurgical investigations and engineering. Summers as observer in openhearth and in primary rolling mill, and metallurgy lab. assistant. Prefers producing industry, plant lab., or consuming industry, ferrous metals. South preferred. Available June 25.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Penn State (Cont.)

Rocco A. Longo
Candidate for B. S. Degree

School Address: 400 West Beaver Ave., State College, Pa.
Home Address: 1004 Franklin Ave., Aliquippa, Pa.

Age 24. Married, one child. Veteran. Attended Edinboro State Teachers College. Courses include chemical, physical, ferrous and nonferrous metallurgy, metallurgical investigations and engineering, ferrous and nonferrous metallography. Summer experience in blast furnace. Prefers producing industry, ferrous metals. East preferred. Available July 1.

Maurice J. Romanell
Candidate for B. S. Degree

School Address: 315 W. Foster Ave., State College, Pa.
Home Address: Market St., Tresckow, Pa.

Age 25. Single. Veteran. Courses include strength of materials, mech. properties of materials, ceramic technology, minerology, historical geology, personnel admin., psychology, safety engineering, technical writing, mineral preparation, in addition to prescribed courses. Summer experience in openhearth and electric furnace departments. Prefers producing industry, or plant laboratory, ferrous metals. Penn. preferred but not essential. Available June 18.

William J. Schuld, Jr.
Candidate for B. S. in Met.

School Address: Sigma Phi Sigma, State College, Pa.
Home Address: 1067 Silliman Ave., Erie, Pa.

Age 24. Single. 4-A draft status. Attended Gannon College. Courses include chemical, physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, metallurgical investigations and engineering. Worked one summer in blast furnace department. Prefers producing industry or industrial plant, ferrous metals. East location preference. Available June 12.

Clifford David Sellers
Candidate for B. S. in Met.

School Address: Box 381, Hamilton Hall, State College, Pa.
Home Address: 5924 N. 9th St., Philadelphia 41, Pa.

Age 22. Single. 1-A draft status. Attended Martin Area College 1 year. Courses include ferrous and nonferrous production metallurgy, physical metallurgy, metallurgical engineering and investigations, refractories and organic chemistry. Part-time work in research metallurgy laboratory on enameled steel. Desires research, preferably ferrous producing industry. East preferred. Available June 15.

Francis L. Turk
Candidate for B. S. Degree

School Address: 510 Garfield Ave., Scottsdale, Pa.
Home Address: Same.

Age 28. Single. Draft status 5-A. Attended St. Vincent College. Courses include chemical, physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, metallurgical investigations and engineering. Foundry Educational Foundation scholarship. Four-year foundry apprenticeship, summer work in foundry. Prefers research or industrial work. No location preference. Available June 15.

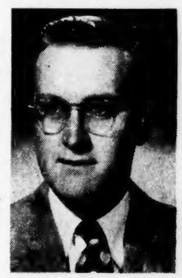
Andrew Robert Walsh
Candidate for B. S. in Met.

School Address: 418 Windcrest, State College, Pa.
Home Address: R. D. #3, Linesville, Pa.

Age 29. Married, 2 children. Inactive res. Attended Edinboro State Teachers College, Univ. of Wash. (V-12), Univ. of Idaho. Courses include electrical eng. survey of ceramic tech., diff. equations, business law and safety engineering, besides prescribed subjects. Worked as seamless tube inspector, tipple operator and laborer in coal company, lab asst. and handyman, and assisted in research projects of graduate students. Desires research in ferrous producing industry. Prefers east or midwest location but not essential. Available June 12.

Lawrence G. Wexlin
Candidate for B. S. Degree

School Address: Rm. 155, Hamilton Hall, State College, Pa.
Home Address: 212 Old Forrest Rd., Carroll Park, Philadelphia 31, Pa.



Age 21. Single. One year at Wilkes College. Courses include physical, ferrous and nonferrous metallurgy, metallurgical investigations and engineering. Prefers producing industry; second choice consuming industry or industrial work. East or midwest location preference. Available June 20.

University of Oklahoma

James K. Dawson
Candidate for M. of Eng. in Mech. and Eng. Met.

School Address: Box 677 W.W.C., Norman, Okla.
Home Address: Same.

Age 35. Married, 3 children. Veteran. B. S. in Elec. Eng., Oklahoma A. and M. Courses include metallography, welding, heat treatment, special research problems (nonferrous). Thesis: effects of carbon on corrosion. A. W. S. paper on production spot welding inspection. Advisor to industrial management eng. society: grad. student instructor. Industrial experience: X-ray, spectroscopy (operator), welding inspector (1½ years), metal sales clerk, welding engineer (2 years), metallurgist. Prefers research or industrial work consuming industry; Al, Cu, stainless or other steels. No territory preference. Available Feb. 1.

University of Pennsylvania

Nathan Davidson
Candidate for M. S. in Met. Eng.
School Address: 5640 Catherine St., Philadelphia 43, Pa.
Home Address: Same.

Age 29. Married. Veteran. B. Met. from Temple Univ. Courses include ferrous and nonferrous production metallurgy, physical metallurgy and metallography, advanced physical, chem. and mech. metallurgy. Thesis: grain growth study of zirconium. Three years experience as laboratory instructor at Temple, teaching metallographic technique and in complete charge of operating the laboratory. Prefers producing industry, teaching or metallography, ferrous or nonferrous. Philadelphia, or Pennsylvania, New Jersey or New York areas preferred. Available July.

University of Pittsburgh

Henry J. Benecki
Candidate for B. S. in Met.
School Address: 137 Murray Hill Road, Glassmere, Pa.
Home Address: Same.

Age 21. Single. 1-A draft status. Courses include applied electricity, strength of materials, nonferrous production metallurgy, metallography and heat treatment, nomography, X-ray radiography, phys. geology, iron blast furnace, temp. and heat flow, tech. English, fabrication, thermodynamics, liquid steel control, electrometallurgy. Honorary fraternities. Prefers producing industry or research, ferrous metals or aluminum. Pittsburgh area preferred. Available June 15.

George A. Brenner
Candidate for B. S. Degree
School Address: 814 Washington Blvd., Pittsburgh 6, Pa.
Home Address: Same.

Age 24. Married. Veteran. Courses include physical metallurgy, liquid steel control methods, metallurgical thermodynamics, nonferrous production metallurgy, iron blast furnace, electrometallurgy, applications of metals. Summer experience in cold strip mill. Desires plant work or producing industry, ferrous metals or aluminum. Middle west or west preferred but not essential. Available June 13.

Richard F. Carlson
Candidate for B. S. Degree
School Address: 202 Center St., Springdale, Pa.
Home Address: Same.

Age 25. Single. Veteran. Courses include nonferrous production metallurgy, metallography, heat flow in materials, fabrication of steel, iron blast furnace, electrometallurgy, liquid steel control methods, sintered powdered iron compacts, thermodynamics, physical metallurgy, nondestructive testing, applications of metals, alloy steels. Has worked as laborer in glass company and gypsum company. Desires ferrous industry or research. Pittsburgh area preferred but not essential. Available now.

William A. Eggert
Candidate for B. S. Degree
School Address: 822 Inwood St., Pittsburgh 8, Pa.
Home Address: Same.

Age 23. Single. Draft status 4-A. Courses include thermodynamics, physical metallurgy, electrometallurgy, liquid steel control, X-ray radiography. Prefers producing industry or research work with ferrous metals. Midwest location preference. Available June 21.

William J. Lepkowski
Candidate for B. S. Degree
School Address: 5th and Bigelow, Pittsburgh 13, Pa.
Home Address: 130 Walnut St., Coverdale, Pa.

Age 21. Single. 1-A draft status. Courses include nonferrous production metallurgy, metallography, iron blast furnace, heat treament, temp. and flow of heat in metals, liquid steel control methods, physical metallurgy, electrometallurgy, applications of metals, alloy steels, business finances. Worked four years with dairy company advancing from clerk to assistant manager. Prefers ferrous research or producing industry. Midwest preferred. Available June 15.

Samuel J. Manganello
Candidate for B. S. in Met. Eng.
School Address: 249 N. Dithridge St., Pittsburgh, Pa.
Home Address: 523 Franklin St., Johnstown, Pa.

Age 21. Single. 1-A draft status. Attended St. Vincent College 1 year. Courses include physical and nonferrous metallurgy, openhearth, thermodynamics, blast furnace, heat flow, electrometallurgy, phase diagrams, air navigation and qualitative analysis. Summer work with openhearths, blast furnaces, coke ovens and plate mills. Desires ferrous producing industry. Prefers Pennsylvania or east location. Available Sept. 15.

George H. McCleskey
Candidate for B. S. in Met. Eng.
School Address: Box #228, Ingomar, Pa.
Home Address: Same.

Age 24. Married, 1 child. Draft exempt. Courses include machine tools and processes, industrial management, historical and physical geology (electives), nomography, applied electricity, technical English, adv. mechanical design and prescribed subjects. Thesis: the determination of the Ms temperature of a hypereutectoid steel. Literature research report on the effect of alloys on tempering. Honorary fraternity. Desires ferrous producing or consuming industry. Pittsburgh preference. Available June.

***FOR FURTHER INFORMATION** about these graduates*
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Pittsburgh (Cont.)

Carl Clifford Sinewe
Candidate for B. S. Degree

School Address: 118 S. Graham St., Pittsburgh, Pa.
Home Address: Same.

Age 22. 1-A draft status. Single. Courses include thermodynamics, phase diagrams, physical metallurgy, liquid steel control methods, applications of metals, electrometallurgy, flow of heat in metals, iron blast furnace, metallography and heat treatment, and nonferrous metallography. Summer work as observer in openhearth shop. Prefers industrial or producing industry, ferrous metals. Free to travel. Available June 8.

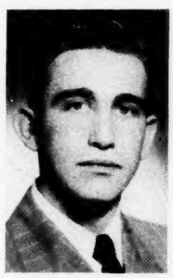
David M. Spehar
Candidate for B. S. Degree

School Address: 921 Monroe Ave., McKeesport, Pa.
Home Address: Same.

Age 21. Single. 1-A draft status. Courses include physical metallurgy, liquid steel control methods, metallurgical thermodynamics, electrometallurgy, physical metallurgy in alloy steels, business law, statistics, and X-rays. Worked two years as observer on seamless pipe mill and openhearths. Prefers producing industry or industrial work, ferrous metals. Pittsburgh or east location preference. Available June.

Michael Timko
Candidate for B. S. in Met. Eng.

School Address: 2915 California Ave., Pittsburgh 12, Pa.
Home Address: Same.



Age 24. Single. 2-A draft status. Courses include metallurgical thermodynamics, physical metallurgy and liquid steel control methods. Desires work in producing industry or research fields with ferrous metals. Pittsburgh district or eastern location preferred. Available June 15.

Purdue University

Ralph E. Anderson
Candidate for B. S. in Met. Eng.

School Address: 126 Andrew Place, West Lafayette, Ind.
Home Address: 2913 Plaza Drive, Fort Wayne, Ind.

Age 26. Single. 5-A draft status. Attended University of Texas 1 year. Courses include physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, plastic metallurgy, igneous solutions, cast irons, metallurgical laboratory. Industrial experience in heat treatment. Desires producing or consuming industry, ferrous metals. Midwest location. Available February.

Donald E. Beitsch
Candidate for B. S. in Met. Eng.

School Address: Cary Hall, N. E., Box 52, W. Lafayette, Ind.
Home Address: 1405 Guiles Ave., Mendota, Ill.

Age 22. Single. 1-D draft status. Courses include nonferrous and ferrous metallurgy, ferrous and nonferrous metallography, physical metallurgy, plastic metallurgy, igneous solutions, physical chemistry, X-ray technology and engineering instrumentation. Honorary fraternities. Desires producing industry, industrial or work with nonferrous metals. No location preference. Available August.

Doyle Geiselman
Candidate for B. S. in Met. Eng.

School Address: 204 Marstellar St., W. Lafayette, Ind.
Home Address: 709 Obispo St., Culver, Ind.

Age 24. Single. Active reserve. Courses include physical chemistry, extraction metallurgy, physical metallurgy, X-ray technology, quality control. Honorary fraternities; student publications. Two summers as milling machine operator and cylinder head inspector. Three years as a part-time employee at the university. Desires consuming industry or materials specification work with all materials. Midwest or southwest location preference. Available June 18.

Milton Bernard Hollander
Candidate for B. S. Degree

School Address: Box 378, Cary Hall, West, W. Lafayette, Ind.
Home Address: 313 Broadway, Bayonne, N. J.

Age 22. Single. Veteran. Courses include thermodynamics, fluid mechanics, basic metallurgy. Structural drawing experience with the Army. Physics laboratory assistant in high school laboratory. Summer work with construction company. Desires industrial plant or producing industry, preferably application of new metals to industrial uses. New Jersey or east location. Available June 20.

George K. Kampschaefer, Jr.
Candidate for B. S. Degree

School Address: 218 Waldron St., W. Lafayette, Ind.
Home Address: 140 Orchard St., Middletown, Ohio.

Age 22. Single. 4-F draft status. Courses include crystallography, nonferrous and ferrous metallurgy, physical metallurgy, fluid flow and heat transfer, X-ray, industrial management, statistical quality control, plastic metallurgy, ferrous metallography, engineering instrumentation. Summer work as laborer and in rigger shop and construction shop. Prefers industrial or producing industry, ferrous metals. Midwest preferred but not essential. Available July 1.

***FOR FURTHER INFORMATION** about these graduates*
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Purdue (Cont.)

Li, Chou-hsiung

Candidate for Ph. D. Degree

School Address: 306 N. Grant St., W. Lafayette, Ind.
Home Address: 16 E. Gate St., Haining, China.

Age 28. Single. Attended Chiao Tung Univ. China. M. S. in Met. B. S. in Mining and Met. Master's thesis: hot-punch hardness test. Doctor's thesis: steel chromizing. U. N. scholarship. Reads several languages. Experienced in use of statistical techniques, including qual. control, experimental design, sampling and anal. of research data. Minor in Gen. Eng. Interested in motion and time study. Worked 2½ years in charge of foundry dept. of a Chinese arsenal; some openhearth experience. Prefers producing industry, research or teaching (ferrous metals). No location preference. Available now.

Alden Van Meter Luhrs

Candidate for B. S. in Mech. Eng.

School Address: Seneca #1-64, W. Lafayette, Ind.
Home Address: 3121 Wynwood Lane, #2, Los Angeles 23, Calif.

Aged 27. Single. 4-A draft status. Attended Pasadena City College. General mech. eng. course plus electives: mineralogy of ores; general, physical, plastic and ferrous metallurgy; motion and time study. Worked 15 months for wire and cable corp. as machine operator on stranding machines, and as a wire drawer and maintenance mechanic in machine shop. Desires producing industry or industrial plant, preferably steel wire. Los Angeles or western U. S. Available now.

Harry A. Matrone

Candidate for B. S. in Met. Eng.

School Address: FPHA 332-a, W. State St., W. Lafayette, Ind.
Home Address: R. R. #1, Batavia, N. Y.

Age 27. Married, 1 child. Veteran. Courses include engineering instrumentation, fluid flow and heat transfer, mechanics of materials, elect. engineering, adv. foundry quality control, labor problems, heat power, and prescribed courses. Worked 2 years as pattern repairman, assemblyman, asst. timekeeper in foundry, sheet metal inspector. Three years as weather forecaster in Marine Corps. Desires producing industry, preferably ferrous physical metallurgy. East preferred but not essential. Available June.

Robert D. Merrick

Candidate for B. S. in Met. Eng.

School Address: 41 North Salisbury, W. Lafayette, Ind.
Home Address: 15 Adams Ave., Cranford, N. J.

Age 23. Single. Veteran. Courses include metallurgical testing and inspection, machine tool laboratory, industrial organization and management, statistical quality control, business letter and report writing as well as prescribed metallurgy courses. Summer work as lab. assistant in metal finishing laboratory. Desires consuming industry or research in copper and brass. East location preferred. Available June.

Arthur T. Mitrano

Candidate for B. S. in Met. Eng.

School Address: Seneca 4-13, W. Lafayette, Ind.
Home Address: 114 Avery St., Rochester, N. Y.

Age 23. Single. 2-A draft status. Courses include statistical quality control, heating and ventilating, igneous solutions, ferrous and nonferrous metallurgy, physical and plastic metallurgy, ferrous and nonferrous metallography. Holds pilot's license. Summer work as lens chipper and presser, heat treater's helper, skilled trades helper (lab. work), lathe hand. Prefers ferrous producing industry or plant. Will locate anywhere in U. S. or abroad. Available June 25.

James G. Morris

Candidate for B. S. in Met. Eng.

School Address: 1005 Salem St., Lafayette, Ind.
Home Address: 416 Front St., Marietta, Ohio.

Age 21. Single. 2-A draft status. Attended Marietta College. Courses include ferrous and nonferrous metallurgy and metallography, physical metallurgy, plastic metallurgy, igneous solutions, electrometallurgy. A.I. M.E. Scholarship, honorary fraternity. Desires research or teaching. Midwest preference. Available June 15.

Keith H. Morrison

Candidate for B. S. in Met. Eng.

School Address: 330 N. Grant, W. Lafayette, Ind.
Home Address: P. O. Box 58, Yorktown, Ind.

Age 21. Single. 1-A draft status. Courses include physical chemistry, nonferrous metallurgy, ferrous and nonferrous production metallurgy, physical metallurgy, fire assaying, ore dressing, plastic metallurgy and igneous solutions, metallography, contracts and specifications, quality control, advanced foundry. Desires producing industry, sales or consuming industry, ferrous metals. Midwest preference. Available June 15.

Donald W. Pontius

Candidate for B. S. in Met. Eng.

School Address: Rural Route #1, Lafayette, Ind.
Home Address: Rural Route #2, Grabill, Ind.

Age 23. Married. 4-A draft status Courses include corrosion, ferrous and nonferrous metallography, general metallurgy, physical metallurgy and plastic metallurgy, testing and inspection, igneous solutions, phys. chem., statistical methods, time and motion studies. Worked as machine operator, and metallurgical lab. technician. Working at univ. part time helping in construction and operation of a high-temperature stress-rupture research project. Especially interested in ferrous physical metallurgy or metallography in manufacturing or fabricating industry, preferably automotive. Midwest preferred. Available July 1.

***FOR FURTHER INFORMATION** about these graduates*

Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Purdue (Cont.)

David B. Scott
Candidate for B. S. in Met. Eng.

School Address: Cary Hall, Box 819, W. Lafayette, Ind.
Home Address: 2512 Eastwood Ave., Chicago 25, Ill.

Age 21. Single. 4-F draft status. Courses include ferrous and nonferrous production met., physical, plastic metallurgy, ferrous and nonferrous metallography, crystallography, electrometallurgy, elements of accounting, statistical analysis for engineers, elements of production management. Honorary fraternities; publicity chairman of two student groups. Desires ferrous producing industry or manufacturing plant. Chicago preferred but not essential. Available June 17.

Floyd I. Steffens
Candidate for B. S. in Met. Eng.

School Address: 331 W. Oak St., W. Lafayette, Ind.
Home Address: 829 E. Rudisill Blvd., Fort Wayne 5, Ind.

Age 27. Married, 1 child. 5-A draft status. Courses include plastic and physical metallurgy, ferrous and nonferrous metallography, igneous solutions, mineral dressing, physical chemistry. Experience in cast iron foundry with core sand mixtures, plating shop, and fabricating (welding) of mild steel channel. Prefers iron or steel producing industry or manufacturing plant. Ohio, Michigan or Indiana. Available June 16.

Robert Tavernier
Candidate for Ph. D. Degree

School Address: 126 Columbia, W. Lafayyette, Ind.
Home Address: Chasse-sur-Rhône, Isere, France

Age 25. Single. "Ingenieur Civil des Mines", Ecole Nationale Superieure des Mines de Paris. Five years of graduate work after receiving B. S. in France. Thesis subject: high-temperature stress-rupture in corrosive atmospheres. Inst. of Interna'l. Education scholarship. Reports and research on metallurgy, mechanical eng., electricity and mining in France. Summer experience in French and British iron and steel plants. Prefers research or producing industry. Will work anywhere in the U. S. or in Europe, especially France. Available Sept.

Rensselaer Polytechnic Institute

Gail A. Brichford
Candidate for B. Met. Eng.

School Address: R.S.E. House, Sage Ave., Troy, N. Y.
Home Address: 21360 Hillsdale Ave., Fairview Park 26, Ohio.

Age 22. Single. R.O.T.C. Draft status 1-D. Courses include physical metallurgy, metallography, production metallurgy, thermodynamics, electrometallurgy, economics, business organization, marketing. Four-year full tuition alumni scholarship. News editor, school paper. Experience as lab. assistant, welders' helper, associate editor of hometown news weekly. Prefers sales or production work, nonferrous. Cleveland or midwest location preferred. Available June 15.

Howard Cuvin
Candidate for B. S. in Chem.

School Address: 6-4 Blatchford Dr., Troy, N. Y.
Home Address: c/o Anne Berger, 657 St. Marks Ave., Newark, N. J.

Age 26. Married. Draft status, disabled vet. Cannot do arduous labor. Courses include metallurgical engineering, physical metallurgy, thermodynamics, electrometallurgy, plus physical chemistry, physics, chemical analysis and related chemistry courses. Essentially a chemist but has good metallurgy background. Prefers sales work where knowledge of both chemistry and metallurgy are required. No geographical preference. Available immediately.

Leslie L. Gould
Candidate for Met. Eng. Degree

School Address: Shaker Rd., Watervliet, N. Y.
Home Address: Same.

Age 30. Married. Courses include production metallurgy, metallography, welding processes and application, physical metallurgy, electrometallurgy, inspection of metals. Experience: Six months as chem. lab. assistant, steel plant; 2 years completed apprentice machinist course; 1½ years in tool design (jigs, fixtures, special machines); 3 years planning and wage rate, time study and methods work; 5 months as a machinist. Prefers industrial or consuming industry. No territory preference. Available June 15.

Maurice F. Hoffman
Candidate for B. Met. Eng.

School Address: 8-4 Georgian Terr., Troy, N. Y.
Home Address: Same.

Age 27. Married, 2 children. Inactive Reserve. Courses include production metallurgy, metallography, physical metallurgy, welding, thermodynamics, alloy steels, ferrous metallurgy, electrometallurgy. Thesis subject: segregation in a high-temperature alloy. Vice-president of junior class. Experience as tool grinder, sheet metal worker. Prefers production supervision, quality control or customer service and sales, ferrous metals. Midwest preferred but not essential. Available June 15.

Peter Lillys
Candidate for B. S. Degree

School Address: 1310 Jacob St., Troy, N. Y.
Home Address: 1033 E. 12th St., Brooklyn, N. Y.

Age 29. Married, 1 child. Veteran. Two years Sampson College. Courses include physical, production and electrometallurgy, metallography, welding processes and applications, alloy steels, inspection of metals, thermodynamics, principles of metallurgy. Worked one year on chromium plating research project at R. P. I., 1 year for construction company. Prefers research or producing industry with high alloy steels. East preferred but not essential. Available June 9.

***FOR FURTHER INFORMATION** about these graduates*
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 1A and 2A.*

Rensselaer (Cont.)

Henry Fisher Mason
Candidate for B. Met. Eng.

School Address: 272 Hoosick St., Troy, N. Y.
Home Address: East St., Newport, N. Y.

Age 23. Single. Veteran. Courses include engineering, production, physical, ferrous and nonferrous metallurgy; physical chemistry; metallography; metal casting and forming; thermodynamics; alloy steels; and electrometallurgy. Summer work in construction labor, as carpenter's apprentice, store clerk and 1 year in electronics repair (Navy). Desires producing or consuming industry or sales (in that order), ferrous metals. No location preference. Available June 15.

Samuel J. McCracken, Jr.
Candidate for B. S. in Met. Eng.

School Address: 2 Eaton Rd., Troy, N. Y.
Home Address: 16 Ackley Ave., Malverne, L. I., N. Y.

Age 23, single, veteran. Courses include physical metallurgy, physical chemistry, thermodynamics, production metallurgy, electrometallurgy, metallography, welding processes and applications; electives are nonferrous alloys and inspection of metals. Served as weapons instructor for one year while in service. Fraternity president. Desires work in producing industry or industrial plant. Nonferrous metals (aluminum) preferred. Any location. Available June 15.

Charles L. Meuche
Candidate for B. Met. Eng.

School Address: 50 9th St., Troy, N. Y.
Home Address: 355 Valley Blvd., Woodridge, N. J.

Age 24. Single. Inactive reserve. 11 months electronics school in service. Courses include welding engineering, nonferrous alloys, inspection of metals (all electives), physical chemistry, production and physical metallurgy, metallography, welding, electrometallurgy, thermodynamics. Worked as radio repairman, factory maintenance man, maintenance and setup man in electroplating shop. Prefers production or development work with nickel, aluminum, magnesium. No geographic preference. Available June 18.

Richard W. Paulovich
Candidate for B. Met. Eng.

School Address: 228 Eight St., Troy, N. Y.
Home Address: 109 Charlotte St., Hartford, Conn.

Age 23. Single. 4-A draft status. Courses include physical metallurgy, metallurgical thermodynamics, physical chemistry, alloy steels, welding processes. Prefers producing industry, fabrication or sales engineering work with ferrous metals. East location preference. Available June.

Arthur C. Sands
Candidate for B. Met. Eng.

School Address: Hunt I, Room 4, Troy, N. Y.
Home Address: 565 Reno St., Rochester, Pa.

Age 30. Single. ROC, inactive reserve. Served 59 months in U. S. Army, Medical Department. Who's Who Among Students in American Universities and Colleges. Two years experience as structural steel fitter, one year with National Supply Co. Prefers quality and production control work, or ferrous production or fabrication. Western region preferred but not essential. Available June 18.

Douglas D. Soutter
Candidate for B. Met. Eng.

School Address: Alpha Chi Rho House, 1621 Tibbitts Ave., Troy, N. Y.
Home Address: 75 Wilson St., Hackensack, N. J.

Age 22. Single. Reserve commission upon graduation. Courses include principles of metallurgy; physical, production, ferrous and nonferrous metallurgy; thermodynamics; metallography; electrometallurgy; alloy steels. Student publication; fraternity vice-president. Worked summers as machine operator in wire rope factory, and Army training in ordnance work. Prefers producing industry or sales. No geographic preference. Available July 1.

Donald T. Surprenant
Candidate for B. Met. Eng.

School Address: 3-7 Edgehill Terrace, Troy, N. Y.
Home Address: 74 Friend St., Adams, Mass.

Age 28. Married, 1 child. 5-A draft status. Naval training at Middlebury College and Univ. of North Carolina. Courses include production met., metallography, physical met., welding processes and applications, thermodynamics, electrometallurgy. Worked three years as chemist of a lime company, three summers in powder metallurgy research at college. Honorary fraternities, treasurer of co-op. assoc. Prefers producing industry or industrial work. Midwest preferred but not essential. Available June 15.

Raymond Jay Towner
Candidate for M. Met. Eng.

School Address: 2236 Fourteenth St., Troy, N. Y.
Home Address: 39 Hayes St., Norwich, N. Y.

Age 25. Single. Veteran. 4-A status. Courses include phys. chemistry, production, physical and ferrous met., metallography, welding processes, nonferrous alloys, electrometallurgy, diffusion in metals. Summer student aide in ferrous branch of phys. met. division, Naval Research Lab. Research fellow on Mg research program at college. Thesis: metallographic examination of the Mg-Li-Al ternary system. Honorary fraternities. Slight preference for producing or consuming industry; Mg, Al or brass. East preferred but not essential. Available June.

Edward Truth
Candidate for B. Met. Eng.

School Address: 19-2 Nott Drive, Troy, N. Y.
Home Address: 1700 Crotona Park East, The Bronx 60, N. Y.

Age 30. Veteran. Married. Two years pre-engineering, Sampson College. Courses include production, physical and ferrous metallurgy, welding processes, metallography, thermodynamics, alloy steels, electrometallurgy, library research on high-temperature alloys in turbines (aircraft). Summer work as draftsman and metalworker's assistant. Prefers producing industry or industrial work, ferrous metals. New Jersey, Penn., New York (Buffalo, Rochester), or Conn. Available June 18.

South Dakota School of Mines and Technology

Richard M. Hedstrom
Candidate for B. S. in Met. Eng.

School Address: 918 St. Joe, Rapid City, South Dakota.
Home Address: Same.

Age 26. Married. 4-A draft status. Attended Univ. of Omaha. Courses include process met., physical met., metallography, calculations, inspection and testing, fabrications, pyrometry, surface treatment, powder metallurgy, atomic physics, electrometallurgy. Research and paper on fabrication and uses of a reverberatory furnace. Summer work processing and refining lead and its byproducts. Desires consuming industry or research. Midwest preferred, near a city. Available June.

Earl M. McCullough
Candidate for B. S. in Met. Eng.

School Address: Box 272, School Mines, Rapid City, S. Dak.
Home Address: Watertown, S. Dak.

Age 25. Single. 4-A status. Attended Univ. of South Dakota 1 year. Courses include physical chemistry and metallurgy, process metallurgy, inspection and testing, calculations, fabrication, metallography, surface treatment, powder metallurgy, X-rays. Tracy C. Jarrett Eng. Scholarship. Desires research (industrial or producing industry), ferrous metals. No territory preference. Available June 18.

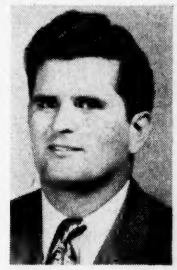
William S. Morrison, Jr.
Candidate for M. S. in Met Eng.

School Address: 13 East St. Joe St., Rapid City, S. Dak.
Home Address: Same.

Age 23. Single. Veteran, 4-A status. Attended Compton College. Holds B. S. in Met. Eng. degree. Courses include chemical engineering, physics of metals, alloy steels, and prescribed metallurgy subjects. Thesis subject: effect of ultrasonics on metals. Experience in development work for Black Hills Research Institute, worked in chemical storeroom and as metallurgical lab. assistant. Desires development or producing industry. Foreign or far west (Ariz., Nev., Calif.). Available July 1.

Arnold Albert Ulmer
Candidate for B. S. Degree

School Address: R. F. D. #1, Box 61, Lesterville, S. Dak.
Home Address: Same.



Age 25. Single. 4-A draft status. Courses include ferrous and nonferrous metallography, physical chemistry, surface treatment of metals, pyrometry, powder metallurgy, metallurgical calculations. Who's Who in Amer. Colleges and Universities. Conducted research report on heat treatment of steels. Prefers producing industry or industrial work with ferrous metals. Midwest territory preferred. Available June 20.

Syracuse University

Eugene E. Ruffing
Candidate for B. S. in Met. Eng.

School Address: 160 South Edwards Ave., Syracuse, N. Y.
Home Address: 68 Whitfield Ave., Buffalo, N. Y.

Age 27. Single. 4-A draft status. Courses include materials of engineering, physical metallurgy, nonferrous metals, metallography, ferrous alloys, properties and behavior of materials, metals processing and X-ray methods. Two years experience in combustion engineering, physical metallurgy lab., blast furnace and openhearth. Producing or consuming industry, ferrous metals. Eastern location. Available June 25.

Temple University

Roy Hetherington, Jr.
Candidate for B. A. Degree

School Address: 478 Burnley Lane, Drexel Hill, Pa.
Home Address: Same.

Age 26. Single. Enlisted reserve corps. Courses include ferrous and nonferrous metallography, ferrous production metallurgy, heat treatment of steels, physical metallurgy and nonferrous production of metallurgy. Member A.S.M. Student Affairs Committee. Desires research, producing industry, teaching or metallographic lab. work in iron and steel. Philadelphia or east preferred but not essential. Available July.

Frank E. Robinson
Candidate for A. B. Degree

School Address: 13 West Cooke, Glenolden, Pa.
Home Address: Same.

Age 21. Single. Courses include physical metallurgy, physical chemistry, nonferrous metals, metallography, metallurgical measurements, iron and steel, economic geology. Worked in a precision casting plant. Desires producing industry, industrial or consuming industry, any nonferrous metals. East preferred. Available June 15.

University of Toronto — Toronto (Cont.)

James Albert Boothe
Candidate for B. A. Sc. Degree

School Address: 174 Kingswood Rd., Toronto, Ont., Canada.
Home Address: Same.

Age 25. Single. Courses include physical metallurgy, extractive metallurgy, ferrous and nonferrous lectures, phase diagrams and thermodynamics, metallurgical calculations, and fuels and combustion. Summer experience as foundry laborer, laboratory technician, plant laborer, sampler and salesman. Desires sales or development work, producing industry, preferably nickel or aluminum. Northeast United States or Canada. Available May 1.

Garnet L. Derrick
Candidate for B. A. Sc. Degree

School Address: 24 Willcocks St., Toronto, Ont., Canada.
Home Address: Same.

Age 28. Single. Veteran, R.C.A.F. Courses include metallurgical engineering, physical chemistry and thermodynamics, physical metallurgy, mineral dressing. Member Assoc. of Professional Engineers. Summer work in machine shops, nickel smelter. Desires producing industry, research or industrial development, ferrous metals, aluminum or brass (in that order). East (Canada) preferred. Available June 1.

Merrill E. Dillon
Candidate for B. A. Sc. Degree

School Address: 115 Balmoral Ave., Toronto, Ont., Canada.
Home Address: 152 Beverly St., Galt, Ont., Canada.

Age 26. Single. R.C.A.F. reserve. Courses include physical metallurgy, extractive metallurgy, ore dressing, assaying, electrochemistry, machine design. Four years experience in pattern making, summer work sand testing in foundry, bench molding. Desires iron or steel foundry, steelmaking plant or sales, in that order. No territory preference. Available May 1.

William Roy Ellis
Candidate for B. A. Sc. Degree

School Address: 508 Glenholme Ave., Toronto, Ont.
Home Address: Same.

Age 30. Married. Courses include assaying, electrochemistry, thermodynamics, ore dressing, production metallurgy, physical metallurgy. Thesis subject: effect of heat treatment on mechanical properties of an agehardenable aluminum alloy. Experience in heat treatment of steel, general machine shop work, planning and laying out of hydroelectric development. Prefers engineering sales or consuming industry. Southern Ontario or any part of Canada preferred. Available May 1.

Stanley D. Entwistle
Candidate for B. A. Sc. Degree

School Address: 1029 Dovercourt Rd., Toronto, Ont., Canada.
Home Address: Same.

Age 25. Married. Naval veteran. Attended Dominion Business College. Courses include physical and extractive metallurgy, thermodynamics, nonferrous production metallurgy, ore dressing. Thesis subject: time-temperature-hardness relations on tempering a eutectic steel. Worked on summer training plan in foundry work and as a sampler in nickel refining and ore treatment. Desires research or producing industry with ferrous metals or aluminum. Prefers central or eastern Canada but not essential. Available May 1.

A. William Marner
Candidate for B. A. Sc. Degree

School Address: 669 Winona Drive., Toronto 10, Ont.
Home Address: Same.

Age 27. Married, 1 child. Veteran. Courses include regularly prescribed courses leading to degree. First class honors each year. Has had experience in heat treating, as a mechanic, and research assistant during the summer. Worked 3½ years as mechanical draftsman. Desires producing industry or research work with ferrous or light metals. No geographic preference. Available May 1.

Donald L. McPherson
Candidate for B. A. Sc. Degree

School Address: 2 Cedar St., Ajax, Ont., Canada.
Home Address: Same.

Age 32. Married, 3 children. Courses include properties of matter, fuels and combustion, electrochemistry, metallurgical theory, mineral dressing, physical met., refractories, production met., metallurgical problems. War Memorial Scholarship. Wireless mechanic in R.C.A.F. during war. Experience as assistant engineer at Canadian G.E. and foreman in aluminum company. Prefers research, teaching, industrial or sales, aluminum or magnesium. East or midwest location. Available May 1.

John J. Sebisty
Candidate for B. Sc. Degree

School Address: 206 Erskine Ave., Toronto, Ont., Canada.
Home Address: Same.

Age 31. Married. Pilot, 5 years in R.C.A.F. Courses include physical metallurgy, production metallurgy, metallurgical problems, ore dressing, thermodynamics. Honors for past three years. Algoma Ore Properties Undergraduate Scholarship 2nd and 3rd years. Summer work in openhearths. Three years industrial plant experience. Desires producing industry or research, nonferrous metals. No location preference. Available May 7.

Toronto (Cont.)

Clifford James Stiles
Candidate for B. A. Sc. Degree
School Address: 131 Ennerdale Rd., Toronto, Ont., Canada.
Home Address: Same.

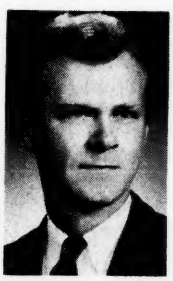
Age 27. Single. Courses include physical metallurgy, metallurgical theory, thermodynamics, refractories, extractive metallurgy, problems. Thesis subject: change of hardness with rate of growth of single crystals. Summer work in Canadian industrial plants and research foundation. Prefers industrial work or producing industry. Anywhere in Canada. Available May 1.

Kenneth L. Wauchope
Candidate for M. A. Sc. Degree
School Address: 125 Kenilworth Ave., Apt. 301, Toronto, Ont., Canada.
Home Address: Same.

Age 37. Married. B. A. Sc. in Met. Eng., with honors, Univ. of Toronto, 1950. Courses include regular undergrad. subjects in met. eng. with special emphasis on phys. met. Undergrad. thesis: microstructure of nodular cast irons. Graduate thesis: applications of radioactive isotopes as tracers in the study of the structure of alloys. Nat'l. Research Council Bursary, 1950-1951. Worked summers as process control inspector in manufacture of graphite products and in nonferrous process development. Prefers research or teaching. Any location. Available July 1.

Yale University

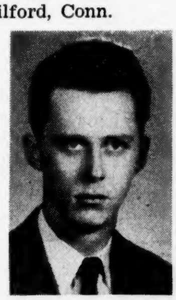
Arnold E. Schuetz
Candidate for B. E. in Met.
School Address: 1766 Yale Station, New Haven, Conn.
Home Address: 20 Vineland Terr.. Hartford 12, Conn.



Age 29. Married. Draft exempt. 3 years Univ. of Conn. Courses include analytical methods, metallography and phase diagrams, metal fabrication, and grad. course in lab. investigation in phys. met. Geo. W. Darr full tuition schshp. 1950-1951. Many electives in the humanities; also accounting and public relations. 5 years of undergrad. study, 2½ in mech. eng., 2 in metallurgy. 1 year as toolmaker apprentice. Prefers production, development or research work in nonferrous metal production. East, midwest or far west. Available June 15.

Arthur F. Steeves, Jr.
Candidate for B. E. in Met.
School Address: 350 Elm St., New Haven, Conn.
Home Address: 118 Harrison Ave., Milford, Conn.

Age 25. Married. Veteran. Courses include metallography, met. lab., metal technology, met. analysis, analytical procedures, general met., electrical engineering and physical chemistry. Charles H. Pine scholarship. Worked in chemical laboratory several months, and on time study for 6 months. Either producing or consuming industry or industrial plant. No location preference. Available July 1.



Youngstown College

William J. Dell
Candidate for B. E. in Met. Eng.
School Address: 165 Ayers St., Youngstown, Ohio
Home Address: Same

Age 29. Single. 4-A draft status. Courses include metallography, iron and steel met., foundry, phys. metallurgy, rarer metals, nonferrous met., calculations. Thesis subject: diffusion of solid copper in liquid aluminum. Worked 3 years in openhearth as helper, slagger, pouring platform worker; 6 months experience in the preparation of metallographic specimens for a met. consultant. Desires either industrial or research work with steel. Midwest preferred but not essential. Available June 15.

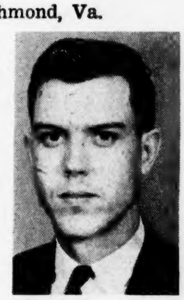
John Joseph Noga
Candidate for B. E. in Met. Eng.
School Address: 1108 Woodside Ave., Youngstown, Ohio
Home Address: Same

Age 24. Married, 1 child. Inactive reserve. Attended Purdue Univ. Courses include physical metallurgy, metallography, iron and steel met., foundry, nonferrous metallography and calculations. Thesis subject: diffusion of solid copper in molten aluminum. Worked 3 years in openhearth as a slagger on pouring platform. Assisted met. consultant for 12 months. Prefers industrial plant, consuming industry or ferrous production. Midwest preferred but not essential. Available June 15.

Virginia Polytechnic Institute

Ray Franklin Adams
Candidate for B. S. Degree
School Address: Box A-252, Va. Tech. Station, Blacksburg, Va.
Home Address: 1406 E. 18th St., Richmond, Va.

Age 21. Married, 1 child. Attended service schools in electronics, 18 months, Univ. of Richmond, 2 years. Courses include general, physical, ferrous and nonferrous metallurgy, metallography, fire assaying, furnace design, mineral dressing, journal review, mining methods and geology. Experience in paper mill, rayon plant and trucking firm. Prefers producing industry or industrial work, ferrous metals. No geographic preference. Available June 14.



Joseph Branch Darby, Jr.
Candidate for B. S. Degree
School Address: P. O. Box 3548, Va. Tech. Station, Blacksburg, Va.
Home Address: R. F. D. #1, Box 220, Peterburg, Va.

Age 25. Single. Veteran. Attended College of William and Mary. Courses include regularly prescribed subjects plus qualitative analysis, geology, pyrometry, differential equations, dynamics, strength of materials, and cast iron. Chairman A.S.M. chapters; Tau Beta Pi. 1 year radar technician, 6 months personnel classification, Marine Corps, 1½ years analytical chemist. Desires development or research, ferrous metals (Al second choice). No geographical preference. Available June 20.

Virginia Polytech (Cont.)

Charles Young Lee
Candidate for B. S. Degree
School Address: Box 3711, Va. Tech. Station, Blacksburg, Va.
Home Address: DeWitt, Va.

Age 27. Single. Veteran. One semester, College of William and Mary. Courses include physical, ferrous, nonferrous and general metallurgy, calculations, metallography, fire assaying, metallurgical journal review, corrosion of metals, furnace design. Summer work as student aide in metallurgy at Norfolk Air Station. Prefers producing industry or industrial plant, ferrous metals. East location preference. Available July 1.

Albert J. Moberg
Candidate for B. S. Degree
School Address: Box 4351, Va. Tech. Station, Blacksburg, Va.
Home Address: Hampton Inst., Hampton, Va.

Age 21. Single. 1-D draft status (R.O.T.C.). Courses include regularly prescribed metallurgical subjects. Secretary-treasurer A.S.M. chapter; honorary fraternity; editorial staff of yearbook. Either producing industry or consuming industry, brass or bronze. Connecticut or east location preferred but not essential. Available June 17.

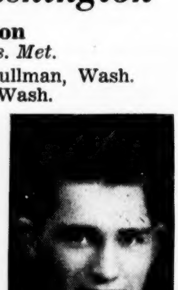
Bernard W. Schaaf, Jr.
Candidate for B. S. in Met. Eng.
School Address: Box 3988, Va. Tech. Station, Blacksburg, Va.
Home Address: 3109 Woodrow Ave., Richmond 22, Va.

Age 21. Single. R.O.T.C. Courses include physical, ferrous and nonferrous met., calculations, metallography, fire assaying, corrosion, furnace design, metallurgical journal review, stress corrosion of aluminum alloys. Fifth in class of 1109. Summer work as lab. asst. to chief metallurgist in Al research project, and cupola foreman in foundry. Plans graduate work in met. and would like industrial assistantship or followship. Research and development or teaching, nonferrous metals, preferably aluminum. East preferred. Available

State College of Washington

Ronald Dennis Nelson
Candidate for B. S. in Phys. Met.
School Address: 405 Campus Ave., Pullman, Wash.
Home Address: Route 2, Grandview, Wash.

Age 21. Single. 2-A draft status. Courses include general, ferrous and nonferrous met., metallography, heat treating of industrial alloys, quality control, research, X-ray, corrosion, calculations, colloquium, physical metallurgy, electrochemistry, physical chemistry, differential equations. High school valedictorian scholarship. American Smelting and Refining Scholarship. Prefers research work. West location preference, but not essential. Available June 10.



University of Washington

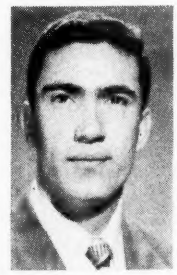
John W. Yeasley
Candidate for M. S. in Met. Eng.
School Address: 3408 Dungeness Place, Seattle 5, Wash.
Home Address: 1040 N. Cottage, Salem, Ore.

Age 34. Married, 1 child. Holds B. S. in Chem. & Indus. Eng. Courses include radiography and X-ray diffraction. Thesis: micro-radiographic study of the copper-copper oxide system. U. S. Bureau of Mines fellowship 1949-1950. Taught high school 1 year. B. A. in Education from North Dak. State Teachers College. Was chemist for construction company 9 months. Desires producing industry or industrial plant, preferably aluminum. Pacific coast preference. Available now.

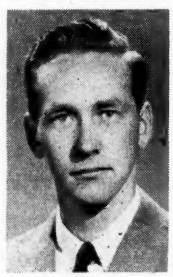
University of Wisconsin

Robert E. Canright
Candidate for M. S. in Met. Eng.
School Address: 408 Spooner, Tripp Hall, Madison 6, Wis.
Home Address: 809 N. Hartwell Ave., Waukesha, Wis.

Age 23. Single. Inactive reserve. Attended Marquette Univ. Courses include metallography, physical chemistry of metals and physical chemistry, X-ray studies, heat treatment of metals, electrical machinery, electronics, economics, corporate finance. Has worked in a centrifugal foundry. Prefers producing industry or industrial plant, ferrous metals. West or south preference. Available June 25.



Robert E. Droegkamp
Candidate for B. S. Degree
School Address: 801 W. Dayton St., Madison, Wis.
Home Address: 4343 No. 17th St., Milwaukee, Wis.



Age 23. Single. Courses include regularly prescribed subjects leading to degree. Has done some experimental work on temper brittleness of low-alloy steels. Worked as welder, summer 1950; openhearth helper, summer 1949; grinder, pipe line, summer 1948; die storage for drop forge company, summer, 1947. Prefers industrial plant or producing industry. Midwest location. Available June.

Leo M. Elijah
Candidate for M. S. Degree
School Address: 710 University Ave., Madison, Wis.
Home Address: 13 Ash Lane, Dadar, Bombay 14, India.

Age 23. Single. B. Sc. (Hon.), Univ. of Bombay. Attended Nat'l. Foundry College, England. Th: phys. properties as a function of composition in binary systems, with relation to their constitution diagram. Grad. work consists of foundry met., phys. met., industrial alloys, heat treatment, calculations, phase rule, thermodynamics, organization, time study. On student daily staff. Experience as officer apprentice, asst. chemist, foundryman and metallurgist. Prefers production control (planning) or producing industry. India, France, or other European country. Available now.

Wisconsin (Cont.)

Richard J. Haffeman
Candidate for B. S. Degree

School Address: Unit 75-C, Badger, Wis.
Home Address: 232½ Main St., Oshkosh, Wis.

Age 28. Married, 2 children. Inactive reserve. Attended Oshkosh State Teachers College. Courses include industrial alloys, electrical machinery, electronics, X-ray studies, hydrometallurgy, metal casting, as well as prescribed studies. Holds Foundry Educational Foundation Scholarship. Experience in core sand testing, as machine operator, mason tender and punch embosser's helper. Desires producing industry, industrial plant or sales with steel, malleable, or gray iron. Midwest. Available June 18.

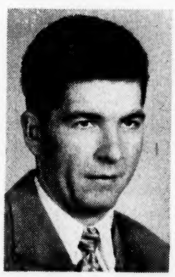
William A. Schrader, Jr.
Candidate for B. S. in Met. Eng.

School Address: 16 Mendota Ct., Madison, Wis.
Home Address: 721 John St., Rockford, Ill.

Age 21. Single. 1-A status. Courses include metallography, physical met., nonferrous met., foundry, heat treatment, industrial alloys, X-ray studies, marketing methods, personnel management, ind. management, sociology, pol. science and welding. Foundry Educational Foundation, Scholarship. Summer work in nonferrous foundry practice, foundry inspection, gray iron foundry, and machine shop. Prefers industrial or research, ferrous metals. Midwest preferred but not essential. Available September.

Richard R. Simonovich
Candidate for B. S. (M. and M. E.) Degree

School Address: 1326 Randall Ct., Madison, Wis.
Home Address: 806½ 12th St., North, Virginia, Minn.



Age 25. Married, 1 child. Inactive reserve. One year at St. Mary's College, Minn. Courses include general process and extractive metallurgy subjects, foundry courses, motion and time study, business management, welding, psychology. Foundry Educational Foundation Scholarship, 2 years. Worked 3 years as mining engr. making railroad surveys, stripping estimates, mapping, shovel grading, control surveys. Interested in foundry work. Prefers producing industry, all types of metals and alloys. Midwest. Available Aug. 17.

David E. Thorn
Candidate for B. S. in Met. Eng.

School Address: 905 Oakland Ave., Madison 6, Wis.
Home Address: 1250 Court St., Janesville, Wis.

Age 29. Single. Veteran. Courses include all prescribed met. eng. subjects and economics, industrial management, personnel management, labor problems. Has worked as journeyman tool and die maker, and as assistant in metal castings laboratory at college. Aviation Machinist Mate in Navy. Desires processing or production in a fabricating industry utilizing both ferrous and nonferrous metals. Midwest preferred but not essential. Available now.

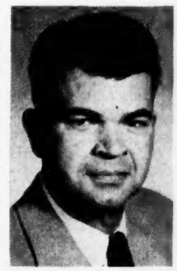
Mark Wallesz
Candidate for B. S. Degree

School Address: 919 University Ave., Madison, Wis.
Home Address: 3005 N. Hackett Ave., Milwaukee, 11, Wis.

Age 21. Single. 1-A draft status. Courses include foundry, metallography, phys. metallurgy, mineral dressing, calculations, industrial alloys, X-ray, welding, machining, physical chemistry, industrial eng. President of professional fraternity. Summer work as retail sales clerk, hardware and paint store. Desires sales, research, or industrial work. No location preference. Available June.

Richard L. Williams
Candidate for B. S. in Met. Eng.

School Address: Unit #3-F, Badger, Wis.
Home Address: Same



Age 33. Married, 2 children. 3-C status. Preprofessional course at Oshkosh State Teachers College. Courses include personnel management, properties and uses of industrial alloys, commercial law, heat treatment of metals, electronics and prescribed courses. Foundry Educational Foundation Scholarship. Ten years varied experience as machinist. Summer work in steel foundry. Part-time research work on enameling of cast iron. Prefers producing industry or research, ferrous metals. Midwest. Available June 15.

David L. Zimmerman
Candidate for B. S. Degree

School Address: 215 N. Mills St., Madison, Wis.
Home Address: 110 S. 8th St., Watertown, Wis.

Age 22. Single. Courses include phys. chemistry, phys. metallurgy, foundry metallurgy, metallography, heat treatment, calculations, properties of industrial alloys, alloy structures, X-ray studies, electrochemistry, hydrometallurgy. Honorary fraternities. Summer experience in steel mill. Desires research or industrial work or quality control, ferrous metals or Mg, al. West preferred but not essential. Available June 20.

LISTED in the preceding pages are the qualifications of junior members of the American Society for Metals who are graduating (or who are candidates for advanced degrees) in the field of metallurgy. All of them will be available between now and next summer.

For further information about these graduates, write direct to the student or to the head of the metallurgy department or of the placement bureau at the school, using the list on pages 1A and 2A.

PASS THIS ON to the employment manager or personnel director of your firm—you will be doing him a big favor.

This list of
available young engineers,
whose qualifications are shown
on the preceeding pages, is
issued as a service to the
metals industry by the
American Society for Metals—
the engineering society
of the Metals
Industry

How conversion of a car-trailer attachment from a weldment to a casting assembly resulted in greater strength, lower weight and cost, and improved appearance.
(E general, T7, CI)

19-E. Pipe Molding Methods. Pat Dwyer. *Foundry,* v. 79, Jan. 1951, p. 88-89, 220-223.
Recommended procedures for sand casting flanged cast-iron pipe. Sources of trouble. (E11, CI)

20-E. "White Coal" Pig Iron. E. K. Smith. *Foundry,* v. 79, Jan. 1951, p. 90-93, 216-218.
Tests to determine the properties of castings made with an imported pig iron produced by the charcoal-electric process. This iron contains considerable amounts of V and Ti but only small quantities of P and S. Photomicrographs of structures, and mechanical properties.
(E10, Q general, M27, CI)

21-E. Effect of Oxygen Content on Iron Casting Properties. F. S. Kleeman. *Foundry,* v. 79, Jan. 1951, p. 100-103, 237-241.
Causes of excessive amounts of iron oxide in gray iron and malleable iron castings and their influence on microstructure and other properties. Deoxidation methods, with particular reference to SiC additions to the cupola. Micrographs and macrographs. 11 ref.
(E10, E25, CI)

22-E. ABC of Foundry Practice. Carbon and Its Effect on Cast Iron. Donald J. Reese. **Methods of Gating Sand Molds.** Pat Dwyer. *Foundry,* v. 79, Jan. 1951, p. 121, 124, 126.
First of a series based on new edition of "Elementary Foundry Technology," by Lawrence A. Hartley, Penton Publishing Co., 1941. (To be continued.) (E25, E22, CI)

23-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry,* v. 79, Jan. 1951, p. 138, 141, 144.
First of a series discussing basic factors involved in operating the cupola. (E10, CI)

24-E. Midget Cupola Used in Research Work. *Foundry,* v. 79, Jan. 1951, p. 146.
Used by U. S. Graphite Co., a division of Wickes Corp., Saginaw, Mich. Dimensions include: shell, 7½ in. i.d.; lining, 4½ in. i.d.; total height, 30 in. (E10, CI)

25-E. New Sand Testing Method Used to Eliminate Casting Defects. W. H. Moore. *Foundry,* v. 79, Jan. 1951, p. 152, 154, 176, 178.
New patented method and equipment developed by Meehanite Metal Corp. Emphasis of control is placed on developing strength in the sand body to withstand rupturing forces rather than on reducing rupturing forces to the point where they do not exceed strength characteristics of the sand. Methods of achieving such strength. (E18)

26-E. Diameter of Pipes for Transmitting Blast From Blower to Cupola. Table of Air Pressure Through Pipes. Table of Air Velocity Through Pipes. *Foundry,* v. 79, Jan. 1951, p. 157-158.
Tabular and graphical presentations. (E10, CI)

27-E. Michigan Foundry Conference Studies Air Pollution Problems. Edwin Bremer. *Foundry,* v. 79, Jan. 1951, p. 160, 164-165.
Summarizes proceedings of conference at Michigan State College, East Lansing, Nov. 10-11, 1950.
(E general, A7)

28-E. Methods of Producing Nodular Cast Iron. R. Collette and Albert De Sy. *Foundry Trade Journal,* v. 89, Dec. 14, 1950, p. 495-498.
Use of various elements. Photomicrographs show effects of Li, Ca, Sr, Ba, Na, B, and Te. Concludes that Mg is most satisfactory from economic and technological viewpoints. (E25, CI)

29-E. Fumes from Oil-Bonded Cores. *Foundry Trade Journal,* v. 89, Dec. 14, 1950, p. 499-500. (Condensed from "Technical Report on Practical Methods of Reducing the Amount of Fumes From Oil-Bonded Cores," H. M. Stationery Office, London.)
(E21)

30-E. Experiences With Nodular Cast Iron. (In German.) *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 16, 1950, p. 520-522. (Translated and condensed from *Gjuteriet,* v. 40, 1950, p. 31-37.)
Results of experiments with Cu-Mg and Ni-Mg alloys as nodulizing agents. Photomicrographs illustrate structures obtained. (E25, CI)

31-E. Development of Casting Methods for Liquid-Cooled Cylinder Blocks of Aluminum Alloy "G": Al-Si-Mg. (In German.) Philipp Schneider and Wilhelm Petzka. *Neue Giesserei,* v. 37 (new ser., v. 3), Oct. 19, 1950, p. 461-466; Nov. 2, 1950, p. 488-491; Nov. 16, 1950, p. 515-520.
(E general, Al)

32-E. On Metal Penetration in Casting. (In English.) Jiro Kashima. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 110-114.
Chemical and physical causes of penetration of metal into the structure of the molding sand. Relative merits of various binders and applicability to ferrous and nonferrous castings. (E18)

33-E. Study on Nodular-Graphite Cast Iron. II. The Graphite-Nodulizing Magnesium Alloys. Tatsuo Tanaka, Akira Muramatsu, and Takeshi Hayakawa. *Journal of Mechanical Laboratory,* v. 4, May 1950, p. 97-101.
Various compositions of nodulizing agents containing Mg were studied in order to determine which alloys would give the best recovery of Mg and the least reaction during addition. (E25, CI, Mg)

34-E. Study on Surface of Casting. IV. Roughness of Green Sand Mold, and Castings. (In Japanese.) Kazuo Katori, Tsuneyuki Okakura, and Kenji Hashimoto. *Journal of Mechanical Laboratory,* v. 4, May 1950, p. 126-136.
Experimental study of the effects of variations in molding sand, of facing material, and of binders, etc.
(E18)

35-E. Malleable Cast Iron Treated With Magnesium. (In Japanese.) Hiromu Tanimura and Fumio Seki. *Journal of The Casting Institute of Japan,* v. 22, no. 8, 1950, p. 1-21.
Experiments on the Mg treatment for production of nodular cast iron. Data and photomicrographs. 12 ref.
(E25, CI)

36-E. Gas Evolution From an Oil-Sand Core. (In Japanese.) Michio Ohno. *Journal of the Casting Institute of Japan,* v. 22, No. 8, 1950, p. 21-29.
Effects of various raw materials and different drying methods. 11 ref. (E18)

37-E. Stickiness of Sand to Patterns in Molding Operations. I. (In Japanese.) Shintaro Hayashi and Shuichi Sugihara. *Journal of the Casting Institute of Japan,* v. 22, no. 9, 1950, p. 4-7.
Results of various experiments conducted to prevent sand sticking to patterns during the molding operation. (E19)

38-E. Foundry Pours Burglar-Proof Doors. *Iron Age,* v. 167, Jan. 18, 1951, p. 68-69.
Procedures by which cast steel safe doors and frames are backed with copper and cast iron by pouring operations. (E23, CI, Cu)

39-E. Designing for Investment Casting. R. L. Wood and D. Von Ludwig. *Machine Design,* v. 23, Jan. 1951, p. 154, 190, 192. (Condensed from "The Fields of Utility of Investment Castings".)
Recommendations. No diagrams.
(E15, EG-a)

40-E. Magnesium Bomber Wheels Cast to Close Tolerances. *Steel,* v. 128, Jan. 22, 1951, p. 85.
Process at Wellman Bronze & Aluminum Co. (E11, Mg)

41-E. Tests on Air Preheating and Equilibria in a 900-Mm.-Diameter Cupola. (In Italian.) Pier Giovanni Maceraudi. *Metallurgia Italiana,* v. 42, Oct. 1950, p. 347-351.
See abstract under similar title from "Internation Gieterij Congres 1949—Amsterdam", (French version.); item 303-D, 1950. (E10, Fe)

42-E. Research on Some Factors Which Influence the High-Temperature Characteristics of Foundry Sands. (In Italian.) Mario Ongaro. *Metallurgia Italiana,* v. 42, Oct. 1950, p. 352-356.
Influence of various moisture and organic-binder contents. Influence of quartz powder, of iron oxide, and of grain size on cohesion at room temperature and on resistance to thermal shock. (E18)

43-E. Ladle Treatment of Cast Iron With Manganese-Containing Alloys. (In German.) Adalbert Wittmoser. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 30, 1950, p. 533-540.
Selection of suitable alloying elements, proposed methods for computing effect of Mg treatment, and a method for calculating the amount of alloy to be added. 26 ref.
(E25, Ci, Mg)

44-E. The Most Commonly Used Molding Machines. (In German.) W. Gesell. *Neue Giesserei,* v. 37 (new ser., v. 3), Nov. 30, 1950, p. 547-550.
Various types described and diagrammed. (E19)

45-E. Contribution to the Study of Preparation of Molding Sands. (In Czech.) Lev Petrzela. *Hutnické Listy,* v. 5, Sept. 1950, p. 353-359, Oct. 1950, p. 406-412.
Effects of various preparation and composition factors. Use of bentonites and their influence on aging of the sands. 35 ref. (E18)

46-E. Graphical Presentation of the Results of Tests on Molding Sand. (In Japanese.) Unokichi Ouchi and Yoshiyuki Nakazawa. *Journal of the Casting Institute of Japan,* v. 22, no. 4, 1950, p. 1-15.
Details of construction of a "grain-fineness" diagram said to be superior to other diagrams which have been used to show relationships between moisture, casting surface, permeability, and strength.
(E18)

47-E. Use of Repetition Sand Casting. (In Japanese.) T. Usui. *Journal of the Casting Institute of Japan,* v. 22, no. 9, 1950, p. 1-3.
It is generally believed that mechanical castings should be done in green or dry-sand molds, while precision castings only need be done in baked molds. However, it is shown that use of the latter on Al castings is advantageous. Defective castings were reduced from 60 to 15%.
(E19, Al)

48-E. Pouring Properties of Some Aluminum Alloys. (In Japanese.) S. Torii. *Journal of the Casting Institute of Japan,* v. 22, no. 10, 1950, p. 1-8.
Pouring temperature or degree of superheating. Proposes a correction for degree of superheating by adding half of the liquidus-solidus temperature difference to the degree of superheating. (E23, Al)

49-E. Research on Molding Sand Binders. III. (In Japanese.) Toshisada Makiguchi. *Journal of the Casting Institute of Japan,* v. 22, no. 10, 1950, p. 9-13.
5% by weight of various binders

was added to the sand, and the test samples baked and tested. Results indicate two relationships between heating time and quantity of exfoliated sand grains. (E18)

50-E. (Book) **Grey Ironfounding.** 125 pages. 1950. Anglo-American Council on Productivity, 21 Tothill St., London S.W.1, England. 3s., 7d.

Report of the Productivity Team which visited the U. S. after first inspecting 29 jobbing foundries in Britain. The first part is divided in sections on productivity, problems facing the British industry, and findings and conclusions. The team then give their impressions of foundry buildings; management; the workers; working conditions; machinery, equipment, and power; patterns; metal melting and control; molding practice; coremaking practice and corebox equipment; molding and core sand; and accounting procedures. (E11, CI)

51-E. (Book) **Centrifugal Casting by the Cire Perdue Process.** C. Rosen. 204 pages. 1949. Bruce Publishing Co., Ltd., Bruce Grove, Watford, Hertfordshire, England.

Collates available information concerning the centrifugal adaptation of the lost-wax method of precision investment casting. The practical point of view on such topics as the production of a master pattern and mold, the casting, mounting and investing of wax patterns, vacuum treatment of investment, drying and preheating metal casting, and cleaning and finishing. (E14, E15)

F

PRIMARY MECHANICAL WORKING

1-F. Hot Working of Tin Bronzes. Daniel R. Hull. *Metal Progress,* v. 58, Dec. 1950, p. 890, 892, 894. Condensed from paper D. W. Dugard Showell.

Previously abstracted from *Journal of the Institute of Metals.* See item 61-F, 1950. (F general, Q23, Cu)

2-F. Extrusion Effects. *Metal Progress,* v. 58, Dec. 1950, p. 912, 914. Translated and condensed from "Extrusion Effects in Al-Zn-Mg Alloys With 4.5% Zn and 3.5% Mg", G. Siebel.

Previously abstracted from *Metallforschung.* See item 19d-69, 1948. (F24, Q general, Al)

3-F. Operation of New 16-In. Electric-Weld Pipe Mill. C. W. Morehead. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 111-115.

Mill of Page-Hersey Tubes, Ltd., Welland, Ontario, Canada. (F26, ST)

4-F. A New Continuous Rolling Mill for Aluminium. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 141-147.

See also items 267-F and 268-F, and 287 through 292-F, 1950. (F23, Al)

5-F. A Swedish Technician's Comments on the American Drop Forging Industry. B. Lagercrantz. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 164-166.

Compares American, British, and Swedish productivity, techniques, and equipment. (F22, ST)

6-F. Speeding Up of Forging. (In Czech.) Frantisek Drastik. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 80-84.

Equipment for reducing time requirements by use of a multiple forging hammer. Use of four hammers striking in rotation reduces time required to 25% of that with one hammer. The process is especially advantageous for high-alloy steels requiring a limited degree of deformation. (F22, ST)

7-F. Mass Production of 2½ Miles of Pipe Daily. D. A. Evans. *Iron Age,* v. 166, Dec. 28, 1950, p. 68-73.

Steel pipe mill of National Tube Co., Pittsburgh. Forming, welding, and cold expanding are involved. (F26, ST)

8-F. Rolls and Rolling; Part XXI. Channels. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Dec. 1950, p. 1435-1446.

Roll-pass diagrams and descriptive material. (F23)

9-F. Wheeling's Fretz-Moon Pipe Mill at Benwood. *Steel Equipment & Maintenance News,* v. 3, Dec. 1950, p. 4-5.
(F26)

10-F. Nonferrous Strip Capacity Expanded. W. Bomboy. *Steel,* v. 128, Jan. 8, 1951, p. 72, 74, 76.

By installing two new 4-high mills, an automatic coil-welder, continuous pickling systems, improved inspection techniques, better materials handling equipment, and by rearranging its entire shop, Riverside Metal Co., Riverside, N. J., is gradually pushing up production of rolled Cu and Ni alloys.
(F23, Cu, Ni)

11-F. Rolling Mills; Design and Provision of Finishing Equipment. J. R. Cuthbert and M. S. Doshi. *Iron and Steel,* Nov. 28, 1950, p. 416-420.

Hot saws and hot shears; cooling banks; roller straightening machines; gag presses; and loading arrangements. (F29)

12-F. New 42-in. Slabbing Mill; Further Progress at Hawarden Bridge. *Iron and Steel,* Nov. 28, 1950, p. 423-428.

A British steel works. (F23, ST)

13-F. Study on the Back Tension Drawing Method. (In English.) Kenichi Nakamura and Hiroshi Kaga. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950 (Special No.), p. 22-25.

Results of experimental investigation for high and low-carbon steel wire. (F28, CN)

14-F. Study of the Back-Pull Drawing Method Part II. The N. N. S. Type Back-Pull Drawing Machine. (In Japanese.) Kenichi Nakamura and Osamu Nishimura. *Journal of Mechanical Laboratory,* v. 4, May 1950, p. 118-125.

Mathematical analysis of the above. Includes geometrical diagrams. (F28)

15-F. Swaged Generator Pole Shoes Conserve Copper Wire. Herbert Chase. *Automotive Industries,* v. 104, Jan. 1, 1951, p. 40-41, 70, 72, 74.

Equipment and procedures for production of pole shoes for use in automotive generators. Hot rolled SAE 1008 steel strip is used as the raw material. (F25, T1, Cn)

16-F. Huge Hydraulic Presses Needed for Making Large Aircraft Part. K. B. Wolfe. *Automotive Industries,* v. 104, Jan. 1, 1951, p. 50-51, 78, 80.

Large German presses which have been brought to the U. S., also Air Force sponsored plant in Adrian, Mich., in which heavy extrusion and forging presses are operated both for manufacturing and research work. Work is not limited to light metals. (F22, F24, Al)

17-F. Motors That Propel the 3.5-Inch Rockets. Charles O. Herb. *Machinery* (American), v. 57, Jan. 1951, p. 164-174.

Forging, machining, and heat treating operations in production of rocket motors. SAE 4140 steel is used. (F22, G17, J general, T25, AY)

18-F. Aluminum Die Forgings Design; Standard Dimensional Tolerances. A. E. Favre and A. J. Orazem. *Product Engineering,* v. 22, Jan. 1951, p. 125-129.

Recommendations. Standard tolerances are tabulated and their use clarified by diagrams. (F22, Al)

19-F. New Giant Presses Will Speed Plane Production. Bill Olson. *Iron Age,* v. 167, Jan. 18, 1951, p. 75-76.

Huge forging and extrusion presses ordered by U. S. Air Force as part of $200 million program; also time, labor, and material savings which will be made possible by their use. (F22, F24)

20-F. Measurement of Temperature During Bar and Wire-Drawing Operations and the Problem of Supercritical Drawing Speeds. (In German.) Walter Reichel. *Stahl und Eisen,* v. 70, Dec. 7, 1950, p. 1141-1145; disc., p. 1145-1146.

Various methods for measuring temperatures developed in drawing dies for steel bars and wire. This temperature can be used as an aid in selection of processes, die designs, drawing rates, lubricants, and coolants. 27 ref. (F27, F28, S16, ST)

21-F. Reduction of Internal Stresses Resulting From the Cold-Drawing of Bars. (In German.) Hans Buhler and Ernst Hermann Schulz. *Stahl und Eisen,* v. 70, Dec. 7, 1950, p. 1147-1151; disc., p. 1151-1152.

Proposed method involves slight redrawing of highly drawn steel bars which reduces their internal stresses 70-90% without impairing their surface conditions and properties. Claims that the method is technically and economically superior to other methods of stress relief. Data for four carbon steels are charted and tabulated. 15 ref. (F27, CN)

G

SECONDARY MECHANICAL WORKING

1-G. Save 43c Per Peening $ With Two New Shot Types. *SAE Journal,* v. 58, Dec. 1950, p. 30-33. Excerpts from "Some of the Economical Aspects of the New Types of Shot", by A. E. Proctor.

Glowing reports on the saving shown by the new peening shot types—cut wire and cast steel—over chilled iron shot led to production tests at Ford comparing the three types. Test results showed the two new shot types net a 43% saving compared with chilled iron shot. (G23, T5, ST, CI)

2-G. Dry Drawing. Richard F. Roy. *Better Enameling,* v. 21, Dec. 1950, p. 14-15, 30-31.

Development of dry powders suitable for use as drawing lubricants. Various methods of application and advantages. (G21)

3-G. Tracing Devices in Shape Flame Cutting. Raymond O. Fish. *Welding Journal,* v. 29, Dec. 1950, p. 1059-1064.

Principles of electronically guided template tracing devices, their preparation and application. (G22)

4-G. Hints for Cutting Thick Steel. O. J. Swan. *Welding Journal,* v. 29, Dec. 1950, p. 1103.

Refers to oxyacetylene cutting. Clarified by diagrams. (G22, ST)

5-G. Processing the Clad Steels. Rick Mansell. *Steel Processing,* v. 36, Dec. 1950, p. 605-611, 645.

Procedures for common types of clad steels. Includes shearing, punching, drilling, bending, drawing,

welding, mechanical and flame cutting, heat treatment, finishing, and handling precautions for surface protection. (G general, CN, AY)

6-G. Machining Studies Aid Aero Production. *Aviation Week,* v. 53, Dec. 18, 1950, p. 22, 25-26, 28-29.

Results of Air Force research on high-temperature alloy machining, published in a recent book by Curtiss-Wright Corp. Various phases were worked on by Curtiss-Wright, Ford Motor Co., Metcut Research Associates, and Massachusetts Institute of Technology. (G17, SG-h)

7-G. Free Machining Copper-Rich Alloys. P. Mabb. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 154-160.

Methods of obtaining satisfactory machinability in brasses, bronzes, and nickel silvers. Effects of Pb, Te, and Se additions, and properties of alloys containing these elements. (G17, Cu, SG-k)

8-G. Metallurgy of Oxygen Cutting Using an Electric Arc. (In French.) F. Danhier. *Soudure et Techniques Connexes,* v. 4, Sept.-Oct. 1950, p. 197-200, disc., p. 200-201.

A combined process in which both the electric arc and a jet of oxygen issuing from the end of a hollow electrode are used. Metallurgical behavior of common metals and alloys, such as Fe, low-alloy steel, Al, Ni, stainless steel, Cu, cast iron, Zn, and Mg, during this type of cutting.
(G22, Fe, ST, Al, Ni, Cu, Zn, Mg)

9-G. The Electrical Cutting of Hard Metal and Steel. (In German.) T. P. Rekshinskaya. *Schweisstechnik,* v. 4, Sept. 1950, p. 101-103. (Translated from the Russian.)

Electrical "erosion" process, in which the metal is cut by the action of sparks between a cutting disc and the metal to be cut, the metal being protected against heating by a cooling liquid.
(G17, ST, C-n)

10-G. Stresses in Material Caused by Deep Drawing; Their Effect on the Design of Dies and Upon Choice of Material. (In German.) K. Ziegler. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 27, July-Aug. 1950, p. 248-257.

Principles of deep drawing, its effect on the sheet metal, and properties and conditions required of material to be drawn; also die design. (G4)

11-G. Practical Considerations With Respect to the Use of Cemented and Sintered Carbides in the Machining of Materials. (In Italian.) Carlo Alfredo Bertella. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 299-304.

Structure and characteristics of sintered carbides for tools. Diagrams show methods of fastening to tool holders. Methods of grinding and use. (G17, T6, C-n)

12-G. First-Aid for Ten Cutting-Die Troubles. Federico Strasser. *American Machinist,* v. 94, Dec. 25, 1950, p. 96-98.

Text and diagrams give remedies. (G2)

13-G. Air Force Curtiss-Wright Report Machinability Data for High-Temperature Alloys. Rupert Le Grand. *American Machinist,* v. 94, Dec. 25, 1950, p. 99-106.

Portion of the results of a $100,000 machinability-research project handled for the Air Force.
(G17, SG-h)

14-G. Tube Coiling. Small Coils for Heat Exchangers. Jack Miller. **Large Coils for Fireboxes.** William C. Keeran. *American Machinist,* v. 94, Dec. 25, 1950, p. 107-109.

Equipment and procedures of Vapor Heating Corp. (G6)

15-G. Power Spinning Eliminates Annealing and Descaling. L. W. Court. *American Machinist,* v. 94, Dec. 25, 1950, p. 114-115.

How stainless-steel bowls for cream separators are spun on a new, power-operated machine. Annealing and descaling, required for press operation, are eliminated and polishing time is reduced. (G13, SS)

16-G. Continuous Filings as Applied to Castings. H. J. Chamberland. *American Foundryman,* v. 18, Dec. 1950, p. 37-40.

New production technique and its applications to castings. (G17)

17-G. How to Cut Steel. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Jan. 1951, p. 5-7.

Recommended oxy-acetylene cutting procedures. (G22, ST)

18-G. Straight-line Appliance Production. Gilbert C. Close. *Finish,* v. 8, Jan. 1951, p. 23-26, 66.

Equipment and procedures used in production of water heaters. Includes forming, galvanizing, and electrostatic spray-painting operations. (G1, L16, L26, CN)

19-G. Stretch-Wrap Forming; Principles and Application of the Hufford Machine. Part I. Tooling Methods and Typical Examples of Forming Procedure From U. S. Practice. Part II. British Practice in the Use of the Hufford Machine. *Aircraft Production,* v. 12, Nov. 1950, p. 317-326; Dec. 1950, p. 334-340.
(G9)

20-G. Comparative Testing of Cutting Tools for Rapid Cutting. (In Russian.) P. N. Pobegalov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Sept. 1950, p. 30-31.

Results for different cutting-tool shapes as applied to hardened steels. (G17, ST)

21-G. Influence of Lubricants During Cutting of Metals. (In Russian.) *Vestnik Akademii Nauk USSR* (News of the Academy of Sciences of the USSR), Sept. 1950, p. 105-106.

Reviews the work of N. P. Zhadin described in his dissertation "Influence of Surface-Active Liquids on Thermal Effects of Cutting of Metals". When large axial loads are applied to the drill, the dependence of specific heat of cutting of metals on concentration of surface-active substances in the lubricant has a marked adsorption character. Existence of the phenomenon of inversion—i.e., transfer of the cutting action of the active liquid to the lubricant during decrease of pressure on the cutting tool—is confirmed. (G21)

22-G. Superfinishing Crankshaft Bearings of Marine Engines. (In Japanese.) Atsushi Inoue. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950 p. 54-61.

Experiences and data charted. Material was mild steel. (G19, CN)

23-G. Band Saws Can Cut Blank Costs. H. J. Chamberland. *American Machinist,* v. 95, Jan. 8, 1951, p. 108-109.

Contoured blanks, even in lots as large as 5000 pieces, may be produced at lower cost by band machining than by the cheapest press tools. (G17)

24-G. New Punch Does Better Job, Slashes Cost. J. R. Reinertson. *Iron Age,* v. 167, Jan. 11, 1951, p. 55-58.

New type of punch, straight-ground and with a soft metal sleeve to absorb vibration, which produces holes with straight walls and no burr to replace drilled and reamed holes. It can make holes in stock thicker than the hole diameter. Pieces per grind have been increased 700% in some cases, and die maintenance cut 80%. (G2)

25-G. Cold-Extruded Shells for the Field Artillery. Ben Kaul. *Machinery* (American), v. 57, Jan. 1951, p. 158-163.

How improved quality, high-strength artillery shells can now be produced from ordinary low-carbon steel by the cold-extrusion process. Substantial savings of steel are achieved, and highly uniform, more accurate shells result. (G5, T2, CN)

26-G. Inexpensive Blanking Punch and Die. P. D'Agostine. *Machinery* (American), v. 57, Jan. 1951, p. 192-194.

The method makes it possible to produce blanks on a standard punch press at a relatively low initial die cost. (G2)

27-G. One Draw Reduces 40-In. Diameter Blank 66 PCT. George Elwers. *Iron Age,* v. 167, Jan. 18, 1951, p. 55-58.

Steel blanks nearly 40 in. in diam. are being reduced approximately 66% to cups with a length-diameter ratio of nearly 1.7:1 in a single press stroke in drawing operations at Scaife Co., Pittsburgh. The method used is reverse drawing, in which the press transforms a blank into a shallow cup, then literally turns the cup inside out as it continues the draw, all in one continuous stroke. The process has also been applied experimentally to other metals. (G4, CN)

28-G. Fundamentals of the Working of Metals. Part 18. George Sachs. *Modern Industrial Press,* v. 12, Dec. 1950, p. 6, 8, 34, 38.

General considerations in bending, strains in bending, minimum bend radii, and springback. (G6)

29-G. Simplified Production of Steel Light Poles. Howard E. Jackson. *Modern Industrial Press,* v. 12, Dec. 1950, p. 13-14, 16, 18, 20.

Miscellaneous press operations and welding in production of poles for street lights by Pacific Car and Foundry Co., Renton, Wash.
(G1, K general, T1, CN)

30-G. Intricate Electrical Instruments Produced at Sangamo Electric. Walter Rudolph. *Modern Industrial Press,* v. 12, Dec. 1950, p. 22, 24, 26, 30, 32.

Miscellaneous press operations, spot welding, and machining in production of the above. Materials include sheet Al, steel, and brass.
(G1, G17, K3, T8, Al, ST, Cu)

31-G. Fabricating Aluminum Barrels. Hugh Jarman. *Light Metal Age,* v. 8, Dec. 1950, p. 6-7, 20.

Equipment and procedures for production of over 1200 15½-gal. beer barrels per day. Operations include deep drawing, welding, heat treatment, and finishing.
(G4, A5, Al)

32-G. Contour Forming Technique Spreads. *Light Metal Age,* v. 8, Dec. 1950, p. 11.

How bus and coach manufacturers are employing machinery and methods designed for aircraft fabrication in Al forming. (G9, Al)

33-G. Spun Neutral Shapes Facilitate Drop Hammer Forming. Gilbert C. Close. *Steel,* v. 128, Jan. 22, 1951, p. 72-74.

By spinning flat metal sheets into neutral shapes prior to forming, Douglas Aircraft eliminates several sets of expensive multiple staging dies. Metal thickness and distribution can be closely controlled, thus minimizing excessive local thinning and rupture during final hammer forming. Materials are largely various Al alloys. (G13, F22, Al)

34-G. Application of Metal Cutting Research to Shop Practice. Part I. Max Kronenberg. *Modern Machine Shop,* v. 23, Jan. 1951, p. 74-78, 80, 82-83.

Construction of productivity charts to convey basic conclusions of metal cutting research to the tool engineer and to management. Typical charts and their use, illus-

trated by numerical examples. (To be continued.) (G17)

35-G. Advantageous Coordination of Metal Forming and Cleaning Operations. G. A. Cairns. *Better Enameling,* v. 22, Jan. 1951, p. 18-19, 29, 31.

Recommended drawing compounds on the basis of the subsequent cleaning and finishing operation. Importance of considering the latter operations when selecting the lubricant to be used in the forming shop. Concerned only with steel. (G21, L12, ST)

36-G. Machinability and Metal Cutting. Francis W. Boulger. *Canadian Metals,* v. 13, Dec. 1950, p. 6-9, 46, 51.

Factors conducive to better machinability, with major attention to machine set-up, tool design, and cutting of alloys. The machining properties of Al, Mg, Cu, and stainless steel. 19 ref. (G17, Al, Mg, Cu, SS)

37-G. The "Cinox" Oxygen-Cutting Process. (In French.) G. Ancion and T. Courard. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 40, Dec. 1950, p. 211-216.

Process for cutting stainless steels, including diagrams of the cutting tip and photomicrographs. The viscous Cr oxide slag first formed is penetrated by a blast of specially treated quartz sand. (G22)

38-G. The Machinability of 12-14% Mn Steel. (In German.) C. Herrmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Dec. 11, 1950, p. 988.

Investigation of three steels containing 1.14, 1.26, and 1.38% C shows that machinability is practically a linear function of carbon content. (G17, AY)

39-G. Electric-Arc Sharpening and Finishing of Hard-Alloy Cutting Tips. (In Russian.) M. N. Ulitin. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Oct. 1950, p. 3-6.

Basic characteristics of the method. Factors influencing rate of production and quality of surface obtained. Technical-economic indexes compare electric-arc grinding with abrasive grinding. Advantages. (G18, SG-j)

40-G. (Book) **Die Design and Diemaking Practice.** Ed. 3, Franklin D. Jones, editor. Industrial Press, 148 Lafayette St., New York 13, N. Y. $7.00.

Extensively revised; five new chapters added, the cross-index expanded, and a detailed table of contents provided. The new chapters cover materials used in diemaking; use of rubber in conjunction with press tools; pointers on design of stampings; heat treatment of die steel; and designing dies for powdered-metal parts. (G general, T5)

41-G. (Book) **The Machining of Copper and Its Alloys.** Ed. 3. 116 pages. 1950. Copper Development Assn., Kendals Hall, Radlett, Hertfordshire, England. (Publication No. 34.) (Gratis.)

Machining properties of Cu alloys and modern machining practice. The present edition contains no major alterations. (G17, Cu)

H

POWDER METALLURGY

1-H. Report on Powder Metallurgy. Thomas A. Dickinson. *Steel Processing,* v. 36, Dec. 1950, p. 619-621.

Brief survey, with emphasis on process equipment and applications. (H general)

2-H. The Production of Uranium and Thorium in Powder Form. P. Chiotti and B. A. Rogers. *U. S. Atomic Energy Commission,* AECD-2974, May 25, 1950, 21 pages. (UF767 U3a)

Method used at the Ames Laboratory. The conversion to the powder form is simple, and may be done with ordinary laboratory equipment in a short time. (H10, U, Th)

3-H. The "Retractometer", an Apparatus for Study of Sintering and of Reactions in the Solid State. (In French.) Stéphane Tacvorian and Maurice Lévecque. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 16, 1950, p. 772-774.

Apparatus is particularly applicable to determination of volumetric variations during sintering. A series of examples show the variety of possible applications. (H15, P10)

4-H. Make It in Powdered Metal. *Canadian Metals,* v. 13, Dec. 1950, p. 12-13, 48.

Advantages and applicability of powder metal process. (H general)

J

HEAT TREATMENT

1-J. Induction Hardening Cuts Costs at Studebaker. *Automotive Industries,* v. 103, Dec. 15, 1950, p. 50, 98.

Miscellaneous applications. (J2, ST)

2-J. 3 Million Axle Shafts Induction Hardened. S. L. Widrig and C. A. Payntor *Iron Age,* v. 166, Dec. 21, 1950, p. 69-73.

Improved physical properties and reduced production costs through use of plain carbon steel instead of alloy grades were achieved by induction hardening of axle shafts. Production was increased and some operations were eliminated. (J2, CN)

3-J. Carbonitriding in Present Practice. Walter H. Holcroft. *Metal Progress,* v. 58, Dec. 1950, p. 843-846.

Work which showed that heating of steel in a neutral carrier gas plus methane and ammonia can produce various effects with minimum distortion ranging from carbon restoration or superficial nitriding to fairly deep and complex cases, depending on gas mixture and heating cycle. (J28, ST)

4-J. Distortion of Toolsteel in Heat Treatment. J. Y. Riedel. *Metal Progress,* v. 58, Dec. 1950, p. 853-859.

Effects of steel composition, quenching medium, and tool shape on distortion. How to predict amount of distortion and how to minimize it in practical heat treatment. (J26, TS)

5-J. Engineering Properties of Iron Castings Can Be Improved by Heat Treatment. C. E. Herington. *Materials & Methods,* v. 32, Dec. 1950, p. 50-53.

The uniformity of Meehanite iron castings is said to make them especially suitable for through-hardening as well as for local or surface-hardening operations. Recommended procedures and typical results. (J26, CI)

6-J. Induction Heating in the Steel Industry. E. H. Browning. *Iron and Steel Engineer,* v. 27, Dec. 1950, p. 82-89.

Principles, clarified by diagrams. Applications and equipment. (J2, ST)

7-J. Suggested Heat Treatment and Forming Data for Boiler and Pressure Vessel Steels. *Welding Journal,* v. 29, Dec. 1950, p. 622s-623s.

A table. (J23, Q23, G general, CN, AY)

8-J. Cementation by Carbon and by Nitrogen. (In French) (Concluded.) J. Pomey. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 727-738.

Final installment. Calculation of coefficient of diffusion on the basis of activity coefficient, chemical factors influencing these coefficients, variation of coefficient of diffusion with temperature, influence of nitrogen on the diffusion of carbon, crystallographic orientation, and diffusion in the presence of two phases. 28 ref. (J28, N1, ST)

9-J. Influence of Homogenizing Heat Treatment During Alloy Production on Workability and Mechanical Properties of Light Alloys. (In French) Martial Renouard. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 760-768; disc., p. 768.

Investigated for an Al-Zn-Mg alloy and two Al-Mg alloys. Modifications of microstructure caused by the treatment are illustrated. (J21, Al)

10-J. Aging of Iron and Steel. (In French.) J. D. Fast. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 779-786; disc., p. 786.

Artificial aging and aging by deformation of Fe, Fe + 0.04% C, Fe + 0.03% O_2, and Fe + 0.02 N_2, were studied. Influence of Mn additions on artificial aging, and of Mn and Ti on aging by deformation, were studied. (J27, N7, Fe, St)

11-J Some Metallurgical Aspects of Superficial Torch Tempering. (In French.) R. Quigna. *Soudure et Techniques Connexes,* v. 4, Sept.-Oct. 1950, p. 206-214.

Investigation of physicochemical phenomena and changes in crystal structure of steel during torch tempering. Behavior during welding, oxyacetylene-torch tempering, and normal heat treatment is compared. Photomicrographs illustrate structures. (J2, J29, N8, CN)

12-J. Aluminum Mirrors Improve the Efficiency of Industrial Furnaces. (In French.) Marcel Palmier. *Revue de l'Aluminium,* v. 27, Sept. 1950, 313-314.

A spherical Al mirror set above a salt-bath furnace, by reflecting the heat which is normally lost, allows a reduction of power consumption and an increased rate of output. On a furnace working under reduced power conditions, this simple low-cost device has led to a 94% increase in production. (J2)

13-J. Surface Hardening of Ends of Railroad Rails. (In Russian.) I. F. Sharov and E. L. Guralnik. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 25-27.

Possibility of increasing service life of rails by surface hardening the adjoining ends, particularly choice of a method which may be applied to rails already in service with a minimum interruption of traffic. Use of an oxy-acetylene torch. Metallic structure of rails after such surface hardening. (J2, CN)

14-J. The Iron Age Mid-Century Reference of Heat Treating. F. R. Morral. *Iron Age,* v. 167, Jan. 4, 1951, p. 267-268, 448-458, 460-462.

Claims to be the most complete and modern index of references on time-temperature-transformation reactions ever assembled. Ferrous and nonferrous metals are included. Effects on austenite transformations of chemistry, grain size, segregation, cleanliness, etc., as well as time and temperature. Isothermal heat treating practices are included. The list of references is preceded by a classified subject guide. (J26, N8)

15-J. Carbonitriding. I-II. *Industrial Heating*, v. 17, Nov. 1950, p. 1936, 1938, 1940, 2050, 2052; Dec. 1950, p. 2120, 2122, 2124.

Part I is condensed from "The Carbonitriding Process of Case Hardening Steel", by G. W. P. Rengstorff, M. B. Bever, and C. F. Floe, *American Society for Metals*, Preprint No. 1, 1950; and Part II from "Constitution of Carbonitrided Cases" (same authors), *American Society for Metals*, Preprint No. 2, 1950. See items 226-J and 230-J, 1950. (J28, M24, N8, CN)

16-J. Steels for Casehardening and Nitriding. (In German.) Fritz Brühl. *Stahl und Eisen*, v. 70, Nov. 9, 1950, p. 1060-1063.

Investigation of the suitability of six low-alloy steels for case hardening and of six other steels for nitriding. Tables and graphs show their respective compositions, tensile strengths, and hardnesses. American and French nitralloy steels. 21 ref. (J28, Q general, AY)

17-J. Determining the Quench Hardenability of Structural Steels. (In German.) Richard Pusch. *Stahl und Eisen*, v. 70, Nov. 9, 1950, p. 1064-1069.

Progress report of cooperative research made to standardize hardenability tests. In the end-quench test, a single specimen can replace a whole series of hardness-depth test specimens. Indicates that the McQuaid-Ehn grain-size determination does not give a reliable indication of hardenability of structural steels. (J26, CN)

18-J. Experiences With the Hardenability Testing of Steels by the End-Quench Method. (In German.) Ernst Kossow and Leopold Schmidt. *Stahl und Eisen*, v. 70, Nov. 9, 1950, p. 1069-1073.

Results of evaluation of the method show that it is very satisfactory for the study of miscellaneous heat treatments and other factors. 11 ref. (J26, ST)

19-J. Investigations on the Deformation of Steels Due to Heat Treatments. (In Japanese with 3-page English abstract.) Minoru Tanaka. *Bulletin of the Tokyo Institute of Technology*, ser. A, No. 2, 1949, p. 1-75.

Part I: dimensional changes due to quenching and decomposition of martensite for plain carbon steels containing 0.19, 0.52, 0.95, and 1.06% C. Part II: results of experiments on influence of quantity and condition of martensite on internal stresses in cemented carbon steels and plain carbon steels containing 0.6, 0.9, and 1.1% C, which were water quenched or austempered. Results of hardness tests and microscopic examination. Part III: effects of alloying elements on the stabilization of martensite, as determined by dimensional changes of eight kinds of nonshrinking steels during quenching, natural aging for two years, and tempering. (J26, Q25, N8, CN)

20-J. Study of Quenching Methods for Hollow Steel Rods. (In Japanese.) Tatsuo Tanaka and Yutaka Imai. *Journal of Mechanical Laboratory*, v. 4, July 1950, p. 75-79.

Results of a study of various methods. (J26, ST)

21-J. Good Carburizing Practice. V. Salt Baths Save Process Time. VI. Choose Steels for Case and Core Properties. T. A. Frischman. *American Machinist*, v. 94, Dec. 25, 1950, p. 89-93; v. 95, Jan. 8, 1951, p. 90-93.

Part V: Fast heating and case depths equal to those produced by other carburizing processes are shown to be possible with liquid salt bath carburizing. Advantages of the process are said to outweigh its shortcomings. Equipment and typical data. Part VI: Choice of steel. (To be continued.) (J28, J2, ST)

22-J. Heat Treatment of Armor Plate. Horace Drever. *Industrial Heating*, v. 17, Dec. 1950, p. 2106-2108, 2110-2112, 2114, 2116, 2118.

Equipment and procedures of Drever Co., Philadelphia. (J general, T2, CN)

23-J. An Examination of the Quenching Constant. H. D. J. Carney and A. D. Janulionis. *Industrial Heating*, v. 17, Dec. 1950, p. 2128, 2130, 2132. (A condensation.)

Previously abstracted from *American Society for Metals*, Preprint No. 19, 1950. See item 228-J, 1950. (J26, SS)

24-J. Five Steps in Setting up a Heat-Treating Department. *SAE Journal*, v. 59, Jan. 1951, p. 54-57. (Excerpts from "The Heat-Treatment of Crawler Tractor Gears," by Roy F. Kern.)

Procedures, equipment, and layout of Allis-Chalmer's Springfield Works gear heat treating department. (J general, T7, ST)

25-J. Residual Stresses in Light Alloy Machine Parts. (In French.) Pierre Migny. *Revue de l'Aluminium*, v. 27, Nov. 1950, p. 398-403.

Origin of the stresses and their removal by thermal and mechanical treatments. (J1, G23, Al)

26-J. Effects of Different Heat-Treatments and Alloying Constituents on the Work-Hardening of Steel. (In German.) Georg Niebch and Anton Pomp. *Stahl und Eisen*, v. 70, Dec. 7, 1950, p. 1166-1173; disc., p. 1173-1174.

Seven low-alloy steels and one carbon steel were investigated, each being annealed and normalized, or soft annealed, then cold rolled to up to 40% reduction in thickness. The greatest hardness increase was observed in the normalized steels and in the Cr steels. Mg greatly accentuated the effect of Cr. 20 ref. (J23, J24, Q29, CN, AY)

27-J. Accuracy of Calculation of Depth of Carbon Penetration in Carburized Steels From Results of Large-Scale Experiments. (In German.) Hans Schrader and Ruth Moufang. *Archiv für das Eisenhüttenwesen*, v. 21, Nov.-Dec. 1950, p. 381-393; disc., p. 393.

Analysis of results of 270 carburizing experiments with different alloy steels showed that the ordinary theory of diffusion in an infinite lattice is practically useless for describing the carburizing process. Wide differences in surface conditions of the steels and in the carburizing effects of different agents limit accuracy of calculation. (J28, ST)

28-J. Effect of Surface Condition of the Material to be Hardened on the Cooling Process in Liquid Hardening Agents. (In German.) Walter Peter. *Archiv für das Eisenhüttenwesen*, v. 21, Nov.-Dec. 1950, p. 395-402.

Experiments were made with soft-iron balls 19 and 40 mm. in diam., and containing 0.58-1.0% C to determine effects of layers of scale and salt on the cooling process in a salt bath, in a highly concentrated salt solution, in oils, and in water used as quenching agents. (J2, Fe)

29-J. Methods of Determining the Depth of Case Hardening of Case-Hardened Materials. (In German.) Artur Kühnert. *Archiv für das Eisenhüttenwesen*, v. 21, Nov.-Dec. 1950, p. 437-440.

A study of various methods for the above. Vickers hardness testing and examination of microstructures were found to give the most accurate results. 10 ref. (J28, Q29, ST)

K

JOINING

1-K. Welding Without Heat or Electricity. *Automotive Industries*, v. 103, Dec. 15, 1950, p. 48, 100.

Some new applications of the "Koldweld" process: "trap weld" for attachment of screw studs to metal panels; wave weld for joining flat stock; stagger weld for joining thin sheet to heavy bar stock; sandwich weld (one piece sandwiched between two others and joined to both); and other applications. (K5)

2-K. New Weldment Shop Adds Versatility. John C. McComb. *Steel Processing*, v. 36, Dec. 1950, p. 612-615, 630-631.

Equipment and procedures for all types of welding at Continental Foundry & Machine Co.'s East Chicago plant. Includes 2 shops—one for heavy steel and one for steel ½ in. thick or less. (K general, A5, CN)

3-K. Welded Pump Rotor Saves Machining. B. J. Rosen. *Iron Age*, v. 166, Dec. 21, 1950, p. 78-79.

As a one-piece part, a carbon-steel pump rotor required too much complicated machining. When made in halves, machining is simpler and less steps are required. Despite cost of assembly, the new method reduces over-all production costs. Special electrode is used. (K1, A5, CN)

4-K. Flash-Welded Tool Joints Show Consistent Strength. William S. Bachman. *Drilling*, v. 12, Dec. 1, 1950, p. 20.

Tests show that fatigue failures hit in the upset area near the weld line but never in the connection itself. (K3, Q7, AY)

5-K. Exacting Control Employed in Flashwelding Tool Joints. *Drilling*, v. 12, Dec. 1, 1950, p. 50. (K3, AY)

6-K. Automatic Welding Keeps Transformers Flowing. *Steel*, v. 127, Dec. 25, 1950, p. 61.

Production-line fabrication of transformers by flash, seam, projection, and spot welding. (K3, T1, CN)

7-K. A Britisher Comments on American Welding. William L. Warner. *Metal Progress*, v. 58, Dec. 1950, p. 894, 896, 898, 900. Condensed from "The Resistance Welding of Mild Steel Sheet", W. S. Simmie.

Previously abstracted from *Welding Journal*. See item 498-K, 1950. (K3, T21, CN)

8-K. Multiple Layer Submerged-Arc Welding of Pressure Vessels. L. C. Stiles and D. H. Curry. *Welding Journal*, v. 29, Dec. 1950, p. 1065-1068.

How difficulties of flux removal were overcome and optimum bead shape and size developed. (K1, ST)

9-K. Crack Sensitivity of Aircraft Steels. *Welding Journal*, v. 29, Dec. 1950, p. 1068-1069.

Jay Bland discusses above paper by A. W. Steinberger, B. J. DeSimone, and J. Stoop. (Sept. 1950 issue; see item 565-K, 1950.) Includes authors' reply. (K9, T5, T24, AY, SS)

10-K. Procedure Approval Tests. Samuel S. Katsef. *Welding Journal*, v. 29, Dec. 1950, p. 1070-1077.

How tests were developed for weldments used in naval equipment. Includes representative data forms and a flow sheet for the performance of tests and recording of results. (K9)

11-K. Latest Developments in Koldwelding. William Dubilier. *Welding Journal*, v. 29, Dec. 1950, p. 1077-1081.

New developments in "Koldweld" pressure welding includes trap welding, wave welding, stagger welding, sandwich welding, lap welding, Koldweld electrical contacts, wires and conductors, and other applications. (K5)

12-K. Flash Welding Nonferrous Materials. *Welding Journal,* v. 29, Dec. 1950, p. 1087-1088.

Charles Bruno, Jerry Martin, and C. R. Dixon discuss separately above paper by F. L. Brandt (Sept. 1950 issue; item 559-K, 1950). (K3, EG-a)

13-K. Copper Alloy Brazing for Production Economy. C. E. Swift and E. B. Brown. *Welding Journal,* v. 29, Dec. 1950, p. 1089-1093.

New braze-welding practices and a new fluxing procedure which cut down the time required for joining and finishing assemblies of thin steel. (K8, ST)

14-K. Stud Welding Speeds Steel Production. Robert C. Singleton. *Welding Journal,* v. 29, Dec. 1950, p. 1094-1096.

How stud welding has proved extremely useful as a maintenance tool for such steel-mill applications as open-hearth doors, wet skid tubes, openhearth burners, and crane rails. (K1, T5, ST)

15-K. Automatic Welding for the Transcontinental Hudson River Crossing. *Welding Journal,* v. 29, Dec. 1950, p. 1100-1101.

Equipment and procedures for arc welding 26-in. diameter pipe line. (K1, CN)

16-K. Tapers for Resistance Welding Electrodes and Holders. W. E. Smith. *Welding Journal,* v. 29, Dec. 1950, p. 1104-1105.

A new, improved standard taper for resistance welding electrodes which has a number of advantages. (K3)

17-K. Physical Metallurgy of Austenitic Stainless Steels. Helmut Thielsch. *Welding Journal,* v. 29, Dec. 1950, p. 577s-621s.

The present state of knowledge and results of recent research investigations on Cr-Ni stainless steels and their weldability. Phase relations, corrosion resistance, crack sensitivity, stress-corrosion cracking, and effects of cold deformation and of subzero and elevated temperatures. 257 ref.
(K9, M24, R general, SS)

18-K. The Welding of Light Metals in an Inert Atmosphere. (In French.) Charles Guinard. *Revue de l'Aluminium,* v. 27, Sept. 1950, p. 337-345.

Equipment and procedures. Mechanical properties of welds in various Al alloys made by this method. (K1, Al)

19-K. Comparison of Different Methods for Welding Cast Iron. (In French.) H. Gerbeaux. *Soudure et Techniques Connexes,* v. 4, Sept.-Oct. 1950, p. 188-195.

Critically reviews the various methods, especially the applicability of an individual welding method to a certain type of cast iron, such as, gray cast iron, malleable cast iron, cast iron with nodular graphite, etc. (K general, CI)

20-K. Experimental Research on Spot Welded Frames. (In French.) Artémy S. Joukoff. *Revue de la Soudure; Lastijdschrift,* v. 6, No. 3, 1950, p. 136-143.

A short resumé of results of the research. Methods of investigation, including compression and fatigue tests. On the basis of tabulated and charted data, spot welded frames appear to be acceptable from the point of view of their rigidity in compression tests. However, fatigue testing indicates that such frames are below required standards. A series of fractures was observed, not in the spot welds, but adjacent to them.
(K9, K3, Q28, Q7, CN)

21-K. The Influence of Certain Operational Factors on the Effectiveness of the Oxy-Acetylene Flame. (In Russian.) N. N. Rykalin and M. Kh. Shorshorov. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 9-11.

The order of decreasing influence for the factors studied was found to be: angle of inclination of flame to surface of metal, thickness of metal, rate of flow of gas mixture or diameter of nozzle, ratio of oxygen to acetylene, distance of nozzle from metal surface, and rate of travel of the flame. Results are applicable to both welding and cutting. (K2, G22)

22-K. Deformation of Tungsten Electrodes During Argon-Arc Welding. (In Russian.) A. Ya. Brodskii and A. V. Petrov. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 11-15.

Causes and effects of reversible and irreversible deformation (elongation and necking, respectively) of the tip of the tungsten electrode in argon-arc welding. (K1)

23-K. Resistance of Sheet Metal During Spot Welding. (In Russian.) L. I. Gastila. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 17-18.

Brief theoretical treatment. Derives a formula for determination of resistance, depending on fundamental factors. (K3)

24-K. Apparatus for Determination of Eccentricity and Thickness of Electrode Coatings for Arc Welding. (In Russian.) M. A. Penkin. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 18-20.

Apparatus is characterized by simplicity and accuracy of measurement up to 0.03 mm. The device is based on the principle of the inductive collector and is designed as an unbalanced a.c. bridge. Electrical circuit is illustrated schematically. (K1)

25-K. Automatic Welding of Large-Diameter Pressure Piping Under Field Conditions. G. A. Polonskii. (In Russian.) *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 20-22.

Methods, apparatus and operating data. (K1, CN)

26-K. One Case of Crack Formation in Welds During Construction of Tanks. (In Russian.) V. I. Shabalin. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 27-28.

Crack formation under subzero weather conditions was investigated. Methods of minimizing this tendency. (K1, CN)

27-K. Electrode Holder With Ejector for Spot-Welding Machines. (In Russian.) V. A. Yakimov. *Avtogennoe Delo* (Welding), v. 21, Sept. 1950, p. 28-29.

Describes and diagrams the apparatus. (K3)

28-K. Metallography of a Blackheart Malleable Cast-Iron Weld. (In Czech.) Stanislav Blazek. *Hutnické Listy,* v. 5, Sept. 1950, p. 374-375.

Microstructure of the weld. Concludes that cracks developing during welding are caused by carbon diffusion from the iron into the weld and rapid heat removal during cooling, the weld becoming martensitic. (K9, M27, CI)

29-K. Gray Iron: Welding; Joining; Cutting. Part III. C. O. Burgess. *American Foundryman,* v. 18, Dec. 1950, p. 48-53. (From Chapter VII, "Gray Iron Handbook," to be issued by Gray Iron Founders' Society.)

Thermit welding, soldering, flash welding, joining to other metals by casting the two metals together, and torch and arc cutting. 55 ref.
(K general, G22, CI)

30-K. Auto Body Repair. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Jan. 1951, p. 10-11.

Welding repair procedures.
(K2, T21, CN)

31-K. Braze-Welding Furnace and Boiler Sections. *Linde Tips and Oxy-Acetylene Tips,* v. 30, Jan. 1951, p. 16-17.

Procedures. Material is cast iron. (K8, CI)

32-K. Welding Goes Up. L. G. Stevens. *Welding Engineer,* v. 36, Jan. 1951, p. 17-19.

Use of welding in construction of 250-ft. library tower at Oklahoma City University. (K general, T26, CN)

33-K. Hot Tie-in on Pipe Line. Clinton Wing and Fred Stettner. *Welding Engineer,* v. 36, Jan. 1951, p. 20-21.

Repair of pipelines while they contain natural gas. Work is done under slight positive pressure of gas, which on escaping envelopes the region with flames. The welders cut and reweld in this zone while wearing asbestos suits. The pressure and resulting flame must be maintained to prevent explosions. (K2, CN)

34-K. Atom-Smasher Chamber. Jack Medoff. *Welding Engineer,* v. 36, Jan. 1951, p. 22-23.

Technique developed for arc welding 2½-in. Al plates used for the frame of the vacuum chamber of a 60-in. cyclotron. (K1, Al)

35-K. Building an Ice Floor. Richard G. Swisher. *Welding Engineer,* v. 36, Jan. 1951, p. 24-25, 28.

How the floor of an ice-skating arena was constructed by use of arc welding. (K1, T26, CN)

36-K. Flash Welding Steel Strip. *Welding Engineer,* v. 36, Jan. 1951, p. 32-33.

New 600-kva. equipment, which includes a system for automatic gaging according to thickness.
(K3, CN)

37-K. Series-Arc Welding. A. R. Lytle and E. L. Frost. *Welding Engineer,* v. 36, Jan. 1951, p. 38-42.

A new method of submerged-arc welding which hooks up the electrodes in series so the work isn't a part of the welding circuit. This technique is said to offer great possibilities for surfacing or cladding where low dilution is essential. Application to cladding with stainless steel, to deposition of Cu alloys and of Ni and Monel, and to hard-facing.
(K1, L24, SS, Cu, Ni)

38-K. Latest Developments in Koldwelding. William Dubilier. *Western Machinery and Steel World,* v. 41, Dec. 1950, p. 56-59.
(K5)

39-K. How To Weld Magnesium. Part Three. Inert-Gas-Shielded Metal Arc Welding. Paul Klain. *Industry & Welding,* v. 23, Nov. 1950, p. 30-31, 34, 46-47.
(K1, Mg)

40-K. Designed for Welding. S. M. Taylor. *Industry & Welding,* v. 24, Jan. 1951, p. 22-24, 44-45.

Applications of welding and flame cutting in production of heavy-duty, off-highway hauling equipment by Euclid Road Machinery Co.
(K general, G22, T4, CN)

41-K. How to Spot Weld Magnesium. Paul Klain. *Industry & Welding,* v. 24, Jan. 1951, p. 26-27, 70.

Clarified by diagrams. (K3, Mg)

42-K. Are *You* Brazing Aluminum? George Terbeek. *Industry & Welding,* v. 24, Jan. 1951, p. 36-39.

Report on a well-equipped shop points up importance of the process and its possibilities for other users. (K8, Al)

43-K. Better Welding at Lower Cost. Lew Gilbert. *Industry & Welding,* v. 24, Jan. 1951, p. 40, 42-43, 67.

Choice of materials; welding method; joint design. (K general, A4)

44-K. Braze-Welding to Repair Large Castings. *Industry & Welding,* v. 24, Jan. 1951, p. 48.

Three applications. (K8, CI)

45-K. The Welded Pressure Vessel Code. *Industrial Chemist and Chemical Manufacturer,* v. 26, Nov. 1950, p. 478-479.

Excerpts from discussion of the Provisional British Standard Code 1500, 1949, for fusion-welded pressure vessels for use in chemical and allied industries.
(K general, T26, S22, ST)

46-K. Reports of International Welding Commissions. *Transactions of the Institute of Welding,* v. 13, Oct. 1950, p. 135-141.

Reports of the following Commissions, given verbally at Paris meeting, June 5-10, 1950: Resistance Welding; Documentation; Terminology; Standardization; Weldability; Residual Stress and Stress Relieving; and Brittle Fractures.
(K general)

47-K. The Weldability of Chromium-Molybdenum Steels. Steel Composition and Arc Welding Procedure. H. F. Tremlett. *Transactions of the Institute of Welding,* v. 13, Oct. 1950, p. 143-156.

The problem of welding Cr-Mo steels in plate form without cracking and with suffiicent ductility in the joint to preclude the possibility of cracks developing during loading. To provide for the first of these requirements, the Reeve fillet-weld test was used and welding factors adjusted until freedom from cracking was obtained. The second requirement was fulfilled by selecting a hardness of 350 D.P.H. as the maximum to be permitted in the fabricated structure. Three types of Cr-Mo steel were examined and welding procedures determined.
(K9, K1, AY)

48-K. Aspects of Welding Distortion in Shipbuilding. D. M. Kerr. *Transactions of the Institute of Welding,* v. 13, Oct. 1950, p. 157-162; *Welding,* v. 18, Dec. 1950, p. 529-538.

Methods for preventing or minimizing distortion, based on experimental work. (K general, T22, CN)

49-K. A Review of Recently Published Information on the Spot Welding of Light Alloys. (With Particular Reference to Stored Energy Methods.) P. M. Teanby. *Welding Research,* v. 4, Oct. 1950 (Bound with *Transactions of the Institute of Welding,* v. 13), p. 94r-101r.

31 references. (K3, Al, Mg)

50-K. The Finnart Pipeline. *Welding,* v. 18, Dec. 1950, p. 508-511.

Welding equipment and procedures used in construction of above in Britain. (K general, T4, CN)

51-K. Formulae for Obtaining Settings for the Spot Welding of Clean Mild Steel. R. W. Humpage, B. C. R. Burford. *Welding,* v. 18, Dec. 1950, p. 515-522.

Formulas are derived for calculating welding settings which will produce the best results in low-carbon mild steel sheet of thicknesses up to 0.250 in. The variables concerned and recommendations of different authorities. 11 ref.
(K3, CN)

52-K. Welded Steel Trailers; Fabrication With Production Line Technique. *Welding,* v. 18, Dec. 1950, p. 539-541, 547.

Equipment and procedures of British firm. (K1, T21, CN)

53-K. Welding of Copper and Aluminum Conductor Wires. (In German.) Hans v. Hofe, Wilhelm Hofmann, and Hans Sottorf. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 2, 1950, p. 165-174.

Al and Cu were successfully upset-welded within a cylindrical form between the melting points of Al and that of the eutectic, Al-Al_2Cu, i.e. 548° C. The liquid eutectic is formed by contact of the two specimens only. The Al rod ends in the form of a flat hollow cone; and the Cu rod, as a pointed cone, is fitted into it. A ring-shaped slot inside the press cylinder surrounds the contact lines. Under a hammer-blow the oxide film is torn; and Al and the newly formed eutectic fill the notch. Tensile strength of the joint exceeds that of the Al rod.
(K3, Cu, Al)

54-K. Autogenous Pressure Welding. (In German.) O. Renner and L. Wolff. *Schweissen und Schneiden,* v. 2, Nov. 1950, p. 283-293.

This is essentially a recrystallization process that occurs below the solidus line. Principles of the process and its uses in welding of rails and pipe lines. Comparison of mechanical properties and a cost analysis show superiority over other methods of welding. 17 ref.
(K2, CN)

55-K. Improving the Welding of a Gas-Tight Container. (In German.) H. Schropp. *Schweissen und Schneiden,* v. 2, Nov. 1950, p. 293-298.

Investigation of a welded tank which was not gas-tight. Procedures adopted to remedy the difficulty, including redesign of the joints, use of different welding-rod compositions, and improved welding techniques. (K2, T26, CN)

56-K. Investigation of High-Efficiency Welding Arcs in a Protective Gas Atmosphere. (In Russian.) G. M. Tikhodeev. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1507-1512.

Investigation used direct current between a carbon electrode and low-carbon steel, in hydrogen, argon, a mixture of hydrogen and argon, and in air. Effects of varying current from 200 to 1000 amp. and arc length from 2 to 12 mm. Method of investigation and results.
(K1, CN)

57-K. Researches on Welding of Quenched Alloy Steel in Japan. (In English.) Minoru Okada. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 115-120.

Summarizes researches conducted by various Japanese organizations between 1937 and 1945. Arc welding was generally used. (K1, AY)

58-K. Welded and Brazed Brake Bands Use 60 Pct Less Steel. W. H. Haviland and S. M. Spice. *Iron Age,* v. 167, Jan. 11, 1951, p. 68-70.

Change in procedures used to make brake bands for the Buick Dynaflow transmission. They used to be machined from thick stock to leave lugs at each end. Now lugs are separate, attached by projection welding, then brazing. Steel required was formerly 5½ lb. per brake: now it's 2½ lb. (K3, K8, T7, CN)

59-K. Welding Light Metals with Inert Gas Shielded Arc. W. Wade Moss. *Light Metal Age,* Dec. 1950, p. 12-14, 16, 27.

As applied to Al, Mg, and Ti.
(K1, Al, Mg, Ti)

60-K. Design for Welded Connections. I. T. B. Jefferson and W. J. Brooking. *Welding Engineer,* v. 36, Jan. 1951, p. 29-31. (From Chapter 6 of "Introduction to Mechanical Design" (Ronald Press, New York.))

Quality and fit-up; weld symbols; internal stresses; distortion of structures; stresses and structures; and how to design a box beam. (To be continued.) (K general, Q25)

61-K. Steel Trunnion Wheels Soft-Surfaced at 60% Saving. J. F. Gulley. *Steel,* v. 128, Jan. 22, 1951, p. 76-77.

How actual welding time for one cast-steel wheel is reduced from 10 days to 9 hr., by use of a mechanized high-density process using a manual hidden-arc welding unit. Mild-steel bars are welded to the wheels. (K1, CI, CN)

62-K. A Revolution in Rubber Bonding to Metals. *Rubber Developments,* v. 3, Dec. 1950, p. 126-128.

New "Redux" process. Mean loads required for failure for different cases. (K11)

63-K. Welding of Light Alloys Using Atomic Hydrogen. (In French.) Charles Guinard. *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 429-435.

Equipment. Advantages. Macrographs show internal structures of the welds in Al alloys. (K1, Al)

64-K. (Book) Riveting Alcoa Aluminum. Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa. 1950, 65 pages.

Riveting in general, common types of heads, strength and protection of joints, driving methods, selection of rivet alloy, and aircraft riveting.
(K13, Al)

65-K. (Book) Schweisstechnik; Ein Handbook. (Welding Technique. A Handbook.) E. Sudasch. 543 pages. Carl Hanser Verlag, Munich 27, Germany.

The usual methods of welding, including the electric arc, oxyacetylene, and electric resistance processes, together with various special techniques. Considerable space is devoted to design of parts for welding, testing of welds, calculation of welding times, and welding costs. A section is included on the welding of plastics. 533 ref. (K general)

L

CLEANING, COATING AND FINISHING

1-L. Westinghouse Reports High Durability for Mica Based Paint System. J. G. Ford and A. J. Kuti. *Paint, Oil & Chemical Review,* v. 113, Dec. 21, 1950, p. 12, 14, 24, 26-27.

See abstract of "Mica-Base Paint System Doubles Transformer Tank Life", *Steel,* item 753-L, 1950.
(L26, ST)

2-L. Kaiser Employs World's Largest Electric Furnace in Quality Porcelain Enameling of Sinks and Bathtubs. Warren Walker, Jr. *Instrumentation,* v. 5, 4th qtr., 1950, p. 22-23.

The process, including the control system. (L27, CN)

3-L. Liquid Flux Technique Reduces Dross Formation. Wallace G. Imhoff. *Steel,* v. 127, Dec. 25, 1950, p. 62, 64.

Coating surface of work in transit between pickling and galvanizing departments with zinc ammonium chloride protects against iron corrosion and minimizes production of dross which accumulates in the bottom of galvanizing pots.
(L16, Zn, ST)

4-L. Wire Brushing No Longer Required For Painting of Rusty Roofs. Carlton C. Porter. *American Paint Journal,* v. 35, Dec. 25, 1950, p. 56, 58.

Results of field tests prove that one coat of Zn-pigment paint gives good protection against rust if loose scale is removed with a stiff brush from galvanized roofs.
(L26, Zn, CN)

5-L. Time, Labor, and Materials Saved by Hot Spraying Industrial Or-

ganic Finishes. Leon M. Jaroff. *Materials & Methods,* v. 32, Dec. 1950, p. 54-56.

Procedures and equipment. Results of comparative tests on lacquer and enamel. Technological and economic advantages. (L26)

6-L. Conservation of Nickel Salts in the Vitreous Enameling Industry. Jason M. Zander. *Better Enameling,* v. 21, Dec. 1950, p. 6-7.
(L27)

7-L. Some Test Results From an Industry-Wide Research Program. F. A. Petersen. *Better Enameling,* v. 21, Dec. 1950, p. 16-19.

Results of work on standard test methods done by the Dept. of Ceramic Engineering, University of Illinois, for Enamel Utensil Manufacturers' Council since 1940. Tests developed or improved were for enamel thickness, impact resistance, thermal shock resistance, resistance to food acids, and wear resistance. (L27, Q general, CN)

8-L. Hard Facing of Steam Valve Seats and Disks. Oscar E. Swenson. *Welding Journal,* v. 29, Dec. 1950, p. 1053-1058.

General welding procedure, fundamental differences in heating effects of low, medium, and high velocity tips and evaluation of devices employed at U. S. Naval Engineering Experiment Station. Different overlay compositions, such as Cr-Ni-B, Cr-Co-Ni-Mo, and Co-Cr-W may be interchanged when flame ratios and deposition conditions are controlled. (L24, T7, SG-m)

9-L. New Production Applications of Hard Facing. E. C. Hurt. *Welding Journal,* v. 29, Dec. 1950, p. 1082-1086.

Several applications and advantages of inert-gas shielded-arc welding. (L24, K1, SG-m)

10-L. Painting Auto Heaters on a Mass Production Basis. William Mattie. *Industrial Finishing,* v. 27, Dec. 1950, p. 28-30, 32, 34, 36, 38.

Equipment and procedures at Eaton Mfg. Co. Includes precleaning of metal, dip coating, electrostatic spray painting, and infrared baking. (L26)

11-L. Developments in Internal Pipe Coating Techniques. J. K. Alfred. *Pipe Line News,* v. 22, Dec. 1950, p. 22-25.

Relative merits of three methods: plastic lining applied in place; cement lining applied in the mill or local plant; and cement lining applied in place. Each is designed to prevent corrosion by crude oil or petroleum products. (L26, CN)

12-L. New Developments in Coatings and Cathodic Protection. Carlton L. Goodwin. *Pipe Line News,* v. 22, Dec. 1950, p. 32-34.

Concerned principally with petroleum and products pipe lines. (L26, R10, CN)

13-L. Anti-Corrosive Compositions; Results of B.I.S.R.A. Research on Underwater Service on Steel. *Paint Manufacture,* v. 20, Dec. 1950, p. 439-442.

Extracts from first report of BISRA committee. (L26, R4, ST)

14-L. Mould Cleaning by the Vapour Blast Process. E. J. Gooding. *Journal of the Society of Glass Technology.* (Transactions Section), v. 34, June 1950, p. 101-107.

Vapor-blast process for cleaning molds for glassware. A mixture of fine abrasive material and water is fed at high velocity from an injector nozzle against the mold surface. (L10, CI)

15-L. Anti - Corrosive Pigments. *Chemical Age,* v. 63, Dec. 2, 1950, p. 772.

Recent German, British, and U. S. work on pigments consisting of inert particles coated with anti-corrosive coloring agents. (L26)

16-L. New Plating Shop; Chippenham Works of the Westinghouse Brake and Signal Co. *Metal Industry,* v. 77, Dec. 8, 1950, p. 259-261.
(L17)

17-L. Galvanizing High-Carbon Steel. (In German.) *Metalloberfläche,* sec. B, v. 2, Nov. 1950, p. 166.

Methods and precautions to be observed in treatment of steels (more than 0.35% C) to be electroplated. (L16, CN, Zn)

18-L. Gray Iron; Malleable; Steel: Galvanizing Characteristics. Robert W. Sandelin. *American Foundryman,* v. 18, Dec. 1950, p. 64-67.

Investigation of appearance, thickness, weight, and weight loss on immersion in molten Zn, for galvanized specimens of 2 gray cast irons, 2 malleable irons, and 6 steels. (L16, Zn)

19-L. The Fabrication of Magnesium Assemblies. Part II. Surface Protection of Magnesium. J. S. Kirkpatrick. *Modern Metals,* v. 6, Dec. 1950, p. 36-38.

Surface protection techniques and preparations employed at Brooks and Perkins. (Concluded.) (L general, Mg)

20-L. The Chemical Silvering of Non-Metallic Surfaces. C. F. Drake. *Research,* v. 3, Dec. 1950, p. 582-583.

Effects of nonionic, anionic, and cationic surface-active agents on the above. (L14, Ag)

21-L. Finishing California License Plates. Fred M. Burt. *Organic Finishing,* v. 11, Dec. 1950, p. 7-10.

Equipment and procedures at Folsom State Prison. Cold rolled steel is cleaned, phosphated, given two dip coats with baking after each dip. Letters and numerals are likewise given two coats by roller coating. (L26, CN)

22-L. Notes on the Selection and Handling of Trichlorethylene Degreasing Plants. *Electroplating and Metal Finishing,* v. 3, Nov. 1950, p. 560-564; Dec. 1950, p. 614-617.

Advantages and disadvantages of the various types of trichlorethylene degreasing plants available to the metal finisher. (L12)

23-L. Stainless Steel Surfacing. F. G. Lang. *Industry & Welding,* v. 24, Jan. 1951, p. 28.

Procedure for re-surfacing turbine buckets and blades. (L24, SS)

24-L. Maybe There's a Use You Can Find for Vapor Welding. Thomas A. Dickinson. *Welding Engineer,* v. 36, Jan. 1951, p. 34-36.

The vapor-deposition process for metallizing. Equipment and procedures; applications and advantages. (L25)

25-L. High Temperature Resistant Ceramic Coatings for Iron, Steel and Alloy Metals. Dwight G. Bennett. *Finish,* v. 8, Jan. 1951, p. 31-35, 52-53; *Better Enameling,* v. 22, Jan. 1951, p. 11-15, 22-23, 26-28.

Results from various organizations. Typical data and test equipment. (L27, Fe, ST, SS)

26-L. Coordination of Fabrication and Cleaning Means Money in the Bank. G. A. Cairns. *Finish,* v. 8, Jan. 1951, p. 27-28, 53, 56.

Drawing lubricants and cleaning materials and solutions of common cleaning problems applicable to steel to be porcelain enameled. (L12, G21, CN)

27-L. How Buick Cuts Forging Cleaning Cost. Herbert Chase. *Steel,* v. 128, Jan. 8, 1951, p. 60-61.

New conveyor-fed blasting system at the Flint, Mich., forge shop uses cut wire shot to clean 12 tons of small forgings per hour. (L10, ST)

28-L. Molybdenum Plating—Answer to Lower Cost Metals for High Temperature Service? *Steel,* v. 128, Jan. 8, 1951, p. 62-64. (Based on "Molybdenum Plating by Reduction of the Pentachloride Vapor," W. J. Childs, J. E. Cline, W. M. Zisner, and John Wulff.

Previously abstracted from *American Society for Metals,* Preprint No. 8, 1950. See item 742-L, 1950. (L25, Mo, Ni, CN)

29-L. A Review of Developments in Metal Decorating. Christian F. Scheehle, Jr. *National Lithographer,* v. 57, Dec. 1950, p. 28-29, 80-82.

Developments in equipment and procedures. (L26)

30-L. Synthetics Have Taken Over. E. C. Haskell. *National Lithographer,* v. 57, Dec. 1950, p. 30-31.

Use of synthetic resins for metal coating and decorating. (L26)

31-L. Tin Plate for the Metal Decorator. George F. Buckle. *National Lithographer,* v. 57, Dec. 1950, p. 32-33, 75, 77.

Short history of the making of tin plate and an insight into some new developments. (L17, Sn, ST)

32-L. Inks for Metal Decorating. William E. Traub. *National Lithographer,* v. 57, Dec. 1950, p. 34, 77-79.
(L26)

33-L. For Metal Decorating Better Plates Are Here. Michael H. Bruno. *National Lithographer,* v. 57, Dec. 1950, p. 36-37, 83, 91-92.

The various types of plates now available to the metal decorator. (L26, L17)

34-L. Report on the Use of Electrolytic Tin Plate in Lithographic Work. *National Lithographer,* v. 57, Dec. 1950, p. 38-39, 79-80.

Research on methods of producing better adhesion of organic topcoats to various tinplate surfaces. Use of resinous coatings of various types. (L26, L17, Sn)

35-L. Metal Decorating Research and Development. John K. Rasmussen. *Modern Lithography,* v. 18, Nov. 1950, p. 63-65, 94; Dec. 1950, p. 47-49.

Some lithographing problems. How to test for adhesion and for the quality of coating materials. New types of equipment and lithographic plates. (L26)

36-L. An Australian Looks at U. S. Plating. J. J. Dale. *Plating,* v. 38, Jan. 1951, p. 58-59.
(L17)

37-L. Plating to Specification. *Plating Notes,* v. 2, Oct. 1950, p. 152-160.

Transcript of discussion held by the Melbourne branch of the American Electroplaters' Society Aug. 17, 1950. (L17)

38-L. Bonderizing for Wire Drawing Installation at Frederick Smith & Co., Wire Manufacturers, Ltd. *Wire Industry,* v. 17, Dec. 1950, p. 970.
(L14, ST)

39-L. Metal on Metal. R. H. Warring. *Machinery Lloyd* (Overseas Edition), v. 22, Dec. 9, 1950, p. 91-93.

Methods for application of various metallic coatings to metallic bases. (L general)

40-L. Hard-Facing by Spray Welding. L. A. Holtgren and R. E. Parker. *Welding,* v. 18, Dec. 1950, p. 523-528.

Technique developed for hard facing special stainless steels which cannot be hard faced satisfactorily by normal procedures. Hard facing powder is sprayed onto the component and then fused by an oxyacetylene torch. (L24, SS)

41-L. Research on Sprayed Metal Coatings. (In German.) Hans v. Hofe, Wilhelm Hofmann, and Günther Suchan. *Abhandlungen der Braunschweigischen Wissenschraftlichen Gesellschaft,* v. 2, 1950, p. 175-184.

Metal was sprayed onto a steel shaft and the latter cut into cylindrical samples. By annealing the disks in hydrogen and in a vacuum between 900 and 1200° C., diffusion between the base steel and the coating was caused to take place. By

this means, resistance to tension and shear was increased. Two steel disks were sprayed with brass and their brass sides placed in contact. These "double" samples were compressed in an Amsler machine and amount of compression measured. From these data, and similar ones for uncoated steel, elastic and plastic compression of the layer was determined. Cast iron, sintered iron, and sprayed steel were studied in a similar manner.
(L23, ST, CI, Fe, Cu)

42-L. "Alubril": A New Process Developed by I. S. M. L. for Chemical Polishing of Aluminum. (In Italian.) *Alluminio,* v. 19, No. 5, 1950, p. 437-449.
Method developed by the Italian Research Institute for Light Metals. Composition; chemistry of the reactions which take place; optimum conditions of operation; preliminary treatment of the objects to be polished; and applications.
(L12, Al)

43-L. Abrasive-Liquid Finishing of the Surfaces of Machine Parts and Tools. (In Russian.) Sh. M. Bilik. *Stanki i Instrument,* (Machine Tools and Equipment), v. 21, Sept. 1950, p. 9-13.
Use of abrasive-liquid blasting. Different types of equipment. Of particular interest is the addition of certain chemical agents to the liquid in order to increase the corrosion resistance of treated parts.
(L10, ST)

44-L. Study on the Application of Material. III. On the Mechanization of Solid Cementation and the Function of Carburizers. (In Japanese.) Hisao Matsumoto. *Journal of Mechanical Laboratory,* v. 4, Jan. 1950, p. 21-27.
Results of experimental and theoretical investigation. Ideal equations of solid-state cementation are derived from diffusion theory and verified experimentally. (L15, J28)

45-L. Aluminum Bright Dip Process Gives Low Cost Reflectivity. F. H. Hesch and C. A. Rosellen. *Western Metals,* v. 8, Dec. 1950, p. 19-20.
Process developed by Kaiser Aluminum and Chemical Corp. can be be used on all aluminum alloys, but the most satisfactory brightening can be obtained on 2S, 3S, 52S, 61S, 150S, and high purity Al as well as on the clad forms of 24S and 75S. Applications are summarized.
(L16, Al)

46-L. New Methods Reduce Costs of Polishing Die Castings. Joseph Geschelin. *Automotive Industries,* v. 104, Jan. 1, 1951, p. 49, 62.
Some new mechanical methods used at Ternstedt Div., General Motors Corp., for Zn-alloy automotive hardware castings. (L10, Zn)

47-L. The Structure of Metal Deposits Obtained by Electrochemical Displacement Upon Zinc. M. E. Straumanis and C. C. Fang. *Journal of the Electrochemical Society,* v. 98, Jan. 1951, p. 9-13.
An attempt was made to identify the composition and structure of nonadherent immersion deposits of noble metals on Zn. For this purpose Cu, Au, Ni, and Ag deposits, obtained by electrochemical displacement from their salt solutions in H_2SO_4, were examined by X-rays. All of them contained redeposited Zn. 25 ref.
(L17, M26, Cu, Au, Ni, Ag, Zn)

48-L. The Formation of Molybdenum Disilicide Coatings on Molybdenum. E. A. Beidler, C. F. Powell, I. E. Campbell, and L. F. Yntema. *Journal of the Electrochemical Society,* v. 98, Jan. 1951, p. 21-25.
Mo can be rendered highly resistent to oxidation by treatment with an H_2-$SiCl_4$ atmosphere at 1000-1800° C. which produces a molybdenum disilicide coating. Coatings thus produced have completely protected the base metal for over 4000 hr. in air at 1000° C. and for over 30 hr. at 1700° C. Thicker coatings, within limits, give proportionately longer lives. (L15, Mo)

49-L. Plating and Metal Spraying: Complementary Processes. W. E. Ballard. *Electroplating and Metal Finishing,* v. 3, Dec. 1950, p. 600-604.
Similarities and differences between the two processes and suggestions which may be of service to both industries. Applications of each. (L17, L23)

50-L. Developments in Internal Pipe-Coating. J. K. Alfred. *World Oil,* v. 132, Jan. 1951, p. 181-184, 186, 190.
Internal coatings now being used to protect pipe lines against internal corrosion by West Texas, Permian Basin sour crudes. Plastic linings, applied in place; cement lining applied in the mill or plant; and cement lining applied in place. Relative costs and other economic data concerning these preventive measures. (L26, CN)

51-L. New Vacuum-Blasting Tools Aid Welding, Drum Cleaning. D. H. Stormont. *Oil and Gas Journal,* v. 49, Jan. 11, 1951, p. 78, 80.
Vacuum equipment is combined with an abrasive blast machine in improved metal-cleaning tool. (L10)

52-L. Metallic and Nonmetallic Coatings for Gray Iron. Charles O. Burgess. *Foundry,* v. 79, Jan. 1951, p. 96-99, 225-236.
Second of 3 articles. Application of hard facings, diffusion coatings, and electrodeposition of various metals to gray-iron castings. 35 ref. (To be concluded.)
(L15, L17, L24, CI)

53-L. Cadmium-Tin Alloy Plating Stops Corrosion. B. E. Scott. *Iron Age,* v. 167, Jan. 18, 1951, p. 59-62.
Extensive tests which led to development of a successful Cd-Sn alloy plating solution. The deposit is obtained from a fluoborate solution and contains approx 75% Cd and 25% Sn. Far greater corrosion resistance in low-alloy steel is achieved than with Cd or Sn of comparable thicknesses.
(L17, R general, Cn, Cd, Sn)

54-L. Clean Surfaces Important in Finishing Die Cast Parts. *Die Castings,* v. 9, Jan. 1951, p. 39-40, 42-43, 61-63.
Cleaning methods for various nonferrous metals which are die cast.
(L12, L13, EG-a)

55-L. Critical Review of the Literature. (Continued.) Henry B. Linford and Edward B. Saubestre. *Plating,* v. 38, Jan. 1951, p. 60-65.
Continues review of various chemical solutions used for plating. Covers solvent cleaners, solvent-emulsion cleaners, and descalers. (To be continued.) (L12)

56-L. Liquid Blasting Trims Die Polishing Time 10%. *Steel,* v. 128, Jan. 22, 1951, p. 77.
Use to remove heat treating scale and discoloration from forging dies at Rockford Drop Forge Co., Rockford, Ill. (L10, ST)

57-L. A Practical Method for Plating on Magnesium. Allen G. Gray. *Products Finishing,* v. 15, Jan. 1951, p. 36, 38, 42, 46, 48, 50, 52, 54, 58, 60, 62, 64.
Reviews work of Dow Chemical Co. on above method, first described by H. K. DeLong, in *Proceedings of the American Electroplaters' Society,* v. 36, 1946, p. 217-226. (L17, Mg)

58-L. Protective Films for Pilot-Plant Deodorizers. R. E. Beal and E. B. Lancaster. *Journal of the American Oil Chemists' Society,* v. 28, Jan. 1951, p. 12-16.
An oxidized oil film is an effective coating for metals used in the construction of pilot-plant deodorizers. The oil film is easily formed on a metallic surface, and can be readily removed when the metal is cleaned with caustic. A silicone varnish film baked on the metal surface is somewhat less effective than an oil film. Other methods of treating steel or stainless steel, which include coating the metal with a polymeric ether-linked wax, grit-polishing, and electropolishing, are fairly effective in reducing corrosion of the metal during deodorization. (L26, SS, ST)

59-L. Internal Pipe Coating Techniques. J. K. Alfred. *Petroleum Engineer,* v. 23, Jan. 1951, p. D26, D28-D34.
Use of plastic and cement-lined coatings in the Permian Basin area for protection against corrosion by sour crude oils. (L26, CN)

60-L. Problems of the Metal Decorator. Charles R. Bragdon. *Interchemical Review,* v. 9, Autumn 1950, p. 43-53.
An illustrated survey. (L26)

61-L. Method for Removing Weld Discoloration. Ira S. Roberts. *Modern Machine Shop,* v. 23, Jan. 1951, p. 256, 258, 260.
Method developed by Armco Steel Corp. is especially useful in removing discoloration from hard-to-get-at interior corners of stainless-steel weldments. The discoloration is removed by passage of direct current through an acid solution, using copper rod as negative and stainless part as positive electrode. (L13, SS)

62-L. Compact Fabricating and Finishing Setup for Refrigerator Evaporators. Ezra A. Blount. *Products Finishing,* v. 15, Jan. 1951, p. 10-16.
Steel refrigerator evaporators are hot-dip galvanized, phosphatized, and sprayed with an Al baking lacquer in the Evaporator Division of Heintz Mfg. Co., Philadelphia.
(L16, L14, L26, CN, Zn, Al)

63-L. Some Practical Notes on Tin/Zinc Alloy Plating for Ferrous Components. *Products Finishing,* v. 15, Jan. 1951, p. 22-24, 26, 28, 30, 32.
(L17, Fe, ST, Sn, Zn)

64-L. Grinding and Polishing Goes Modern. H. N. Acker. *Canadian Metals,* v. 13, Dec. 1950, p. 32-33, 35, 50.
Procedures, equipment, and applications of abrasive-belt grinding.
(L10)

65-L. Polish Up Your Buffing Data. H. J. McAleer. *Canadian Metals,* v. 13, Dec. 1950, p. 36-38, 51.
A 4-in-1 process involving stock removal, burnishing, coloring, and chemical action. Surveys the wide range of buffing compounds and buffing methods used. (L10)

66-L. Improved Finish Through Better Surface Cleaning. J. C. Harris. *Canadian Metals,* v. 13, Dec. 1950, p. 41-42, 44-45.
Various methods (mainly chemical) for removal of submicroscopic surface films from metals. Methods for evaluation of quality of the cleaning job. 13 ref. (L12)

67-L. Metal Colouring and Bronzing; Review of Methods of Surface Preparation. C. Harris. *Metal Industry,* v. 77, Dec. 22, 1950, p. 295-298.
(L14)

68-L. Plating Aluminum; Commercial Methods of Depositing Nickel and Chromium. R. Fyfe. *Metal Industry,* v. 77, Dec. 22, 1950, p. 300-302.
Two commercial methods and a new process, including surface pretreatment and analytical procedures for the plating bath, which has produced successful deposits with less than 2% rejects. (L17, Al, Ni, Cr)

69-L. Electrochemical Potential in a Hydrofluoric Acid Solution and Electropolishing of Columbium. (In French.) M. Cottin and M. Haissinsky. *Journal de Chimie Physique et*

de Physico-Chimie Biologique, v. 47, Sept.-Oct. 1950, p. 731-732.

Electrochemical potential and optimum conditions for electropolishing a 5-mm. Cb rod were determined. (L13, Cb)

70-L. Production and Use of "Doublé". (In German.) W. Radecker. *Metall*, v. 4, Dec. 1950, p. 516-517.

The distinction between the mechanical electrolytic deposition of noble metals on base metals, or rolled-on gold vs. electroplating. The term "doublé" refers to the rolled-on or clad process. (L22, L17, Au)

71-L. Cold-Rolled Strip Electrolytically Tinned. (In German.) Vincens Seul and Robert Mintrop. *Stahl und Eisen*, v. 70, Dec. 7, 1950, p. 1154-1164; disc., p. 1165-1166.

Comparative data on properties and microstructure of hot dipped and electrolytic tin plate. Relative merits of various plating baths. (L17, CN, Sn)

72-L. Non-Electrolytic Nickel Plating as a Protective Coating During Nitriding. (In Czech.) Jan Korecky. *Hutnické Listy*, v. 5, Oct. 1950, p. 414-416.

Process developed by A. Brenner of the National Bureau of Standards (U. S.) was found to be suitable for local protection during nitriding. A layer 0.002-0.003 mm. thick, grown in 10-15 min., is said to be adequate for protection during the usual nitriding process (500° C. for 48-96 hr.). (L17, J28, Ni, ST)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

1-M. Grand Prize, 1950 Metallographic Exhibit. *Metal Progress*, v. 58, Dec. 1950, p. 842.

Micrograph showing veining in ferrite. Prepared by Sten O. Modin, Metallografiska Institutet, Stockholm, Sweden. (M27, ST)

2-M. Heat Treatment and Structure of Commercial Titanium. Joseph Maltz and Vincent DePierre. *Metal Progress*, v. 58, Dec. 1950, p. 862-866.

Metallographic procedures and effects of various heat treatment schedules on microstructure. (M27, J general, Ti)

3-M. An X-Ray Method for the Study of Phase Changes at High Temperatures. H. T. Heal, and H. Mykura. *Metal Treatment and Drop Forging*, v. 17, Autumn 1950, p. 129-135.

A method of studying phase transformations in solids by continuously measuring the intensity of X-rays diffracted from one set of crystal planes. A bent-crystal monochromator, Seemann-Bohlin focusing, and a Geiger counter as detector are used. An S-curve for a 2½% Ni steel, determined by this method, shows fair agreement with curves for the same steel obtained by standard microscopic technique during continuous cooling and in the martensite region, where other methods become difficult. (M22, N8, AY)

4-M. Experimental Study of Structural Rearrangements Caused by Heat Treatment of Some Complex Binary Ferronickels. (In French.) E. Josso. *Revue de Métallurgie*, v. 47, Oct. 1950, p. 769-777; disc., p. 778.

Results of a dilatometric study of three ferronickels having compositions fairly close to that of Ni_3Fe. Influence of temperature of annealing and of Ni content on thermal-expansion characteristics were determined. Volumetric anomalies resulting from structural rearrangements were determined more exactly than heretofore. 16 ref. (M23, P10, Fe, Ni)

5-M. Structure, Hardness, and Workability of Iron-Carbon-Silicon Alloys. (In German.) R. Mitsche and W. Schreiber. *Neue Giesserei*, v. 37 (new ser., v. 3), Nov. 2, 1950, p. 485-488; disc., p. 488.

The alloy cast irons investigated contained 3.64-2.80% C, 4.53-9.9% Si, up to 2.26% Mn, and relatively high P and S contents. Experiments showed that all of them can be readily machined and drilled. 13 ref. (M27, Q29, G17, CI)

6-M. Properties of Continuously Cast Refined Steels. (In German.) Helmut Krainer and Bruno Tarmann. *Stahl und Eisen*, v. 70, Nov. 23, 1950, p. 1098-1106; disc. 1106-1108.

Study of the structures and mechanical properties of 19 steels in the as-cast state as well as after forging or rolling. Carbide dispersion in ledeburitic toolsteels was also investigated, and it was found that the reticular structure of ledeburite is somewhat finer in continuously cast steel than in ingot steel. Includes graphs, tables, micrographs, and macrographs. (M27, Q general, CI, TS)

7-M. Concerning a Eutectic Grain. (In Russian.) Ya. V. Grechnyi. *Doklady Akademii Nauk SSSR*, (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 933-934.

One of the phases of the fayalite-wustite eutectic in synthetic alloys of FeO with SiO_2 and in iron-ore agglomerates, is shown to be present in monocrystalline form. (M27, Fe)

8-M. Crystal Structures of the α-Phase of the System Al-Mg and of the α-Phase of the System Tl-Bi. (In Russian.) E. S. Makarov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 935-938.

Results of X-ray investigation of the above intermetallic phases. (M26, Al, Mg, Tl, Bi)

9-M. The Structure of Martensite Electrolytically Separated From Tempered Steel. (In Russian.) M. P. Arbuzov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, 1085-1087.

Investigated for tempered carbon steel containing 0.80, 0.98, 1.16, 1.38, and 1.51% C, using an electrolytic method for carbide-phase separation developed by the author. Structure was determined by X-ray methods. It was found that, during this separation, the structure of the martensite does not change. (M26, ST)

10-M. The Crystal Structure of a Sigma Phase, FeCr. David P. Shoemaker and Bror Gunnar Bergman. *Journal of the American Chemical Society*, v. 72, Dec. 1950, p. 5793.

Results of work on 2 single crystals of FeCr sigma phase, about 0.1 mm. in diam., which the authors succeeded in isolating. (M26, Fe, Cr)

11-M. Accurate Determination of the Lattice of Beta-Titanium at 900° C. Daniel S. Eppelsheimer and Robert R. Penman. *Nature*, v. 166, Dec. 2, 1950, p. 960.

Procedure and data claimed to be highly accurate. (M26, Ti)

12-M. Microhardness of the Cu-Al Solid Solution in 90-10 Aluminum Bronze. (In Italian.) A. Gragnani. *Alluminio*, v. 19, No. 5, 1950, p. 403-410.

The constitution diagram was investigated by means of microhardness determinations with emphasis on the Cu-Al solid solution. Data demonstrate the possibility of existence of two different alpha phases, one of which is located on the boundary between the α and $\alpha+\beta$ phases. 11 ref. (M24, Cu, Al)

13-M. Abnormal Steel and Its Structure. (In English.) Keizo Iwasé and Masao Homma. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Aug. 1949, p. 95-100.

Refers to anomalous structures found in the hypereutectoid zones of some carburized steels. Nature of the "abnormality" and theories of its formation. Experiments on influence of alloying elements and on mechanism of formation. Phase changes occurring during such formation. 29 ref. (M27, N3, AY)

14-M. Metallographic Study of the Martensite Transformation in Lithium. J. S. Bowles. *Journal of Metals*, v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 44-46.

Techniques developed for the metallographic examination of Li. The microstructural characteristics of Li martensite are described and illustrated. 11 ref. (M27, N9, Li)

15-M. Atomic Relationships in the Cubic Twinned State. W. C. Ellis and R. G. Treuting. *Journal of Metals*, v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 53-55.

Shows that the twinned state is characterized by a lattice of coincidence sites. Imperfections are required at stable lateral-twin interfaces. Twinned regions can occur with relative ease in the diamond cubic structure. (M26)

16-M. Transitions in Chromium. M. E. Fine, E. S. Greiner, and W. C. Ellis. *Journal of Metals*, v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 56-58.

Discontinuous changes of Young's modulus, internal friction, coefficient of expansion, electrical resistivity, and thermoelectric power are described as evidence for a transition in chromium near 37° C. Although the X-ray diffraction pattern gives no clue, a difference between thermal expansivity and temperature dependence of lattice parameter suggests a crystallographic change. Young's modulus data disclosed another transition near −152° C. 14 ref. (M26, P10, P11, P15, Q21, Cr)

17-M. Crystallographic Angles for Magnesium, Zinc and Cadmium. Edward I. Salkovitz. *Journal of Metals*, v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 64.

Tabulation of angles between crystallographic planes in close-packed hexagonal crystals of Mg, Zn, and Cd. (M26, Mg, Zn, Cd)

18-M. A Low-Temperature Microscope Stage. R. G. Rhodes. *Journal of Scientific Instruments*, v. 27, Dec. 1950, p. 333-334.

A simple cold chamber for optical observation of crystals below room temperature, under conditions relatively free from frosting. It is designed for the polarizing microscope with objective up to 20X. The low temperatures can be regulated to within ±0.1° C. down to −140° C. by manual control of the heating elements. (M21)

19-M. Apparatus for the Study by Electron Diffraction of the Effect of Temperature on Surface Films. J. W. Menter and J. V. Sanders. *Journal of Scientific Instruments*, v. 27, Dec. 1950, p. 335-336.

Specimen holders for heating "reflection" and "transmission" specimens for examination by electron diffraction. The temperature of the specimens may be measured to within a few degrees in the range 15-200° C. A film holder with which it is possible to make up to 20 exposures without breaking the vacuum of the diffraction camera. (M22)

20-M. Focusing in Electron Microscopy. R. S. M. Revell and A. W. Agar. *Journal of Scientific Instruments,* v. 27, Dec. 1950, p. 337.

Series of micrographs of a metal grain illustrate the importance of accurate focusing to avoid misinterpretation. (M21)

21-M. The Setting of Single Crystals from Zero Layer Curve Photographs. P. T. Davies. *Journal of Scientific Instruments,* v. 27, Dec. 1950, p. 338.

Procedure enables rapid setting to be made by X-rays of crystals which have already been set approximately by optical means. It is based on the method given by Weisz and Cole, but less calculation is required. (M21)

22-M. (Book) **Electron Microstructure of Steel.** 49 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $1.35.

Presents 47 carefully prepared electron micrographs of various steel constituents, printed on special paper. Illustrates effects of variations in metallographic polishing and etching practices, replica techniques, and photographic procedures. Both mechanical polishing and electropolishing were used to some extent. (M21, ST)

23-M. (Book) **X-Rays.** Ed. 3. B. L. Worsnop and F. C. Chalklin. 126 pages. 1950. John Wiley & Sons, 601 W. 25th St., New York 1, N. Y.

A monograph presenting the modern position of X-rays. Covers: determination of wave-length and X-ray spectroscopy; X-ray spectra; the scattering of X-rays; optical phenomena; and photo-electrons and ionization. 28 ref. (M21, M22, S11, S13)

24-M. (Book) **Alloy Systems.** J. O. Lord. 380 pages. Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker St., London W. C. 2, England. 40s.

British edition. See item 4A-68, 1949. (M24, N general)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

1-N. Diffusion of Chromium in α Cobalt-Chromium Solid Solutions. John W. Weeton. *National Advisory Committee for Aeronautics,* Technical Note 2218, Nov. 1950, 42 pages.

Investigated for 0 to 40 atomic % Cr at temperatures of 1360, 1300, 1150, and 1000° C. 11 ref. (N1, Co, Cr)

2-N. Radioactive Sodium as a Metallurgical Tracer. *Metal Progress,* v. 58, Dec. 1950, p. 902, 904.

See abstract of "Modification in Aluminium-Silicon Alloys", B. M. Thall and Bruce Chalmers, *Journal of the Institute of Metals,* item 17-N, 1950. (N12, S19, Al, Si)

3-N. Grain Boundaries and Sintering. A. P. Greenough. *Nature,* v. 166, Nov. 25, 1950, p. 904-905.

Some experiments carried out on specimens cut from cold-rolled, high-purity Ag sheet containing a number of uniformly distributed blowholes. A flat, electropolished surface was prepared on each specimen, which was then annealed in O_2-free N_2. In the annealed specimens, most of the blowholes lay in the planes of the grain boundaries, and the large number of small blowholes in the original material had been replaced by a smaller number of larger holes of nearly uniform size. Possible mechanisms involved. (N3, Ag)

4-N. Crystallographic Study of Structural Precipitation in Duralumin. (In French.) H. Lambot. *Revue de Métallurgie,* v. 47, Oct. 1950, p. 709-726.

The unusual X-ray diffraction patterns of complex Al alloys during their structural hardening were investigated. These are shown to indicate the presence of disordered phases prior to true precipitation. Three types of duralumin were investigated. Diffraction patterns illustrate results. 21 ref. (N7, Al)

5-N. The Physics of Metals. Diffusion and Interaction of Impurities and of Structural Defects in Metals. (In French.) C. Crussard. *Metaux & Corrosion,* v. 25, Sept. 1950, p. 203-226.

A theoretical investigation. Existence of two types of defects is assumed, those caused by presence of foreign atoms and those caused by regions of lower-than-average density. The influence of "diffusion" of both of these types on crystal structure and mechanism of diffusion is analyzed and explained. Formulas for calculation of energy of interaction for the case of diffusion are proposed. 20 ref. (N1)

6-N. Experimental Study of the Phenomenon of Diffusion. (In French.) A. Guinier. *Métaux & Corrosion,* v. 25, Sept. 1950, p. 227-236.

Coefficient of diffusion and experimental methods for its determination were investigated. Despite the fact that such determinations are very difficult, complicated, and not precise, it was possible to verify the equation of Fick for many cases of diffusion of gases and metals into metals. Methods of investigation and interpretation of data. 18 ref. (N1)

7-N. Reactions Induced by Strain Hardening and Annealing in 18-8 Low-Carbon Steels. (In French.) Paul Bastien and Jacques Dedieu. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 23, 1950, p. 862-864.

Proportion of α-phase formed upon cold drawing of stainless steels containing 0.035% C and 4-12% Ni, by magnetic and X-ray methods. Importance of the effect of Ni, which hinders formation of α-phase. (N6, SS)

8-N. Isothermal Transformations of the Characteristic Inclusions in Ferrochromiums. (In Italian.) Raffaello Zoja. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 321-325.

Results of a study at 800, 900, 1100, and 1300° C. are illustrated by photomacrographs. Concludes that 95% of the inclusions are composed of the two basic constituents —α and β. The first is high in SiO_2; the second in CrO_3; other constituents are derived from these by reduction with H_2 or Si. (N6, Fe-n, Cr)

9-N. Formation of a Fine Structure in Aging of Aluminum Alloys. (In Russian.) N. N. Buinov and R. M. Lerinman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 929-931.

Investigated by the electron microscope for saturated solid solutions of Al-Cu (4% Cu), Al-Ag (10% Ag), and Al-Mg-Si (14% Mg_2Si) alloys at 150-200° C. and above. Influence of annealing temperature on fineness of structure is revealed by a series of electron micrographs. (N7, Al)

10-N. Temperature Dependence of the Stability of Supercooled Phases. (In Russian.) N. N. Sirota. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 11, 1950, p. 971-974.

Theoretically investigated for the isothermal transformations. Formulas for determination of the dependence are proposed and curves of stability vs. degree of super-cooling are plotted on the basis of these formulas for carbon steel. Comparison of experimental and calculated data show close agreement. (N8, CN)

11-N. Influence of Concentration Stresses on the Rate of Lateral Growth of Pearlite Grains. (In Russian.) L. N. Aleksandrov and B. Ya. Lyubov. *Doklady Akademii Nauk, SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1081-1084.

The above problem was theoretically investigated assuming that "concentration stresses" are phenomena caused by heterogeneous distribution of concentration of the dissolved component, resulting in additional diffusion flow. Formulas are proposed describing this influence. These formulas are interpreted for different values of the variables. (N3, ST)

12-N. Two Types of S-Curves of Stability of Supercooled Phases (In Russian.) N. N. Sirota. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1105-1108.

Experimental investigation of the stability of supercooled austenite from carbon and alloy steels shows that variation with temperature of stability—characterized by time of transformation under isothermal conditions at subcritical temperatures—may be described by two S-curves designated as "normal" and "complex." Causes of the existence of these two curves are indicated for single-component and multi-component systems. As an example, an S-curve of stability of supercooled austenite from a Cr steel (1% C and 3% Cr) is analyzed. Data are charted. (N8, ST)

13-N. Electrical Conductivity Method for Measuring Self-Diffusion of Metals. J. H. Dedrick and G. C. Kuczynski. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1224-1225.

Proposes method in which contact conductance of an interface between two metallic spheres or hemispheres is measured. (N1)

14-N. Coefficient of Self-Diffusion of Copper. G. Cohen and G. C. Kuczynski. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1339-1340.

Results of measurement of the above are charted and tabulated for a range of temperatures. (N1, Cu)

15-N. The Superstructure in the α-Phase of Silver-Magnesium Alloys. L. M. Clarebrough and J. F. Nicholas. *Australian Journal of Scientific Research,* v. 3, ser. A, June 1950, p. 284-289.

X-ray and electrical resistivity studies of an Ag-Mg alloy containing 25 atomic % Mg. It is concluded that a superlattice exists at this composition, the order-disorder transformation occurring between 386 and 389° C. (N10, P15, Ag, Mg)

16-N. Diffusion of Copper Along the Grain Boundaries of Nickel. R. S. Barnes. *Nature,* v. 166, Dec. 16, 1950, p. 1032-1033.

Experimental evidence showing

that Cu diffuses preferentially along the grain boundaries of Ni. Thin Cu and Ni strips of commercial purity, stacked alternately, were annealed in an atmosphere of hydrogen to remove the surface oxide films, and then hot rolled together. This treatment gave very good bonding between the two metals, and no flaws could be seen microscopically in the interfaces. (N1, Cu, Ni)

17-N. Iron-Nickel Alloys; The $\alpha \rightarrow \gamma$ and $\gamma \rightarrow \alpha$ Transformations. N. P. Allen and C. C. Earley. *Iron and Steel,* v. 23, Nov. 28, 1950, p. 455-458; disc., p. 476-477.

Results of study, illustrated by graphs and photomicrographs. (N8, Fe, Ni)

18-N. Austenite; Acceleration of the Rate of Isothermal Transformation. M. D. Jepson and F. C. Thompson. *Iron and Steel,* v. 23, Nov. 28, 1950, p. 458-461; disc., 477-478.

Effects of temperature oscillation and of stress on rate were studied using two carbon steels. Data and microstructures obtained. (N8, CN)

19-N. Austenite; Breakdown Below the M_s Temperature. F. C. Thompson and M. D. Jepson. *Iron and Steel,* v. 23, Nov. 28, 1950, p. 462-466; disc., p. 477-478.

(N8, ST)

20-N. En Steels; Discussion on Atlas of Isothermal Transformation Diagrams. *Iron and Steel,* v. 23, Nov. 28, 1950, p. 473-476.

Discusses Atlas issued in June 1949 as Special Report No. 40 of the Iron and Steel Institute. (N8, AY)

21-N. Supersaturated Mixed Crystals From the Melt. (In German.) Wilhelm Hofmann. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 1, No. 1, 1949, p. 83-88.

According to the equilibrium diagram, 1.85% Mn will dissolve in solid Al at the eutectic temperature. However, by quenching the molten alloys, a high degree of supersaturation can be achieved. By pouring into a key-shaped Cu mold, cooling by liquid air, and evacuating, 7.6% Mn was put into solid solution. X-ray diagrams show that concentration differences within these highly supersaturated mixed crystals are smaller than expected. A survey of similar phenomena in other systems and in technical alloys. (N12, Al, Mn)

22-N. Movement of Gold and Palladium Atoms Along the Surface of Crystals of Zinc Oxide. (In Russian.) A. B. Shekhter, A. I. Echeistova, and I. I. Tretyakov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 465-468.

The structure of layers of Au and Pd, applied in vacuum on crystals of ZnO, was investigated by use of the electron microscope. Effects of heating were determined. It was found that the temperatures of initiation of extensive motion of atoms are located close to their melting points. (N1, M26, Au, Pd)

23-N. Continuous Transition Between Tetragonal and Cubic Forms of Alloys of Indium with Thallium. (In Russian.) E. S. Makarov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 485-491.

Detailed X-ray investigation of the crystal structure of solid solutions of In with Tl showed that, with increasing content of Tl, a continuous transformation of the face-centered tetragonal lattice of In into the face-centered cubic lattice of the alloy In_3Tl, which has a disordered structure, takes place. Experimental method and results. (N6, In, Tl)

24-N. Solubility of Nitrogen in Molten Chromium and Alloys of Chromium and Silicon. (In Russian.) V. S. Mozgovoi and A. M. Samarin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1529-1536.

See abstract of condensed version under similar title from *Doklady Akademii Nauk SSSR,* item 278-N, 1950. (N12, Cr, Si)

25-N. Thermodynamical Meaning of the Martensitic Changes in Steels and in Other Alloys. (In English.) Keizo Iwase and Sakae Takeuchi. *Japan Science Review,* ser. 1, v. 1, Mar. 1949, p. 190-199.

Summarizes results of several Japanese papers which indicate that lattice changes like martensite formation are not characteristic of steel only, but occur generally in alloys whose equilibrium diagrams are of a particular type. (N8, N9)

26-N. An Investigation on Isothermal Transformation in Steels. I. The Cause of Modification of S-Curves of Some Alloy Steels. (In English.) Takejiro Murakami and Yunoshin Imai. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 87-92.

Several alloy steel specimens containing various percentages of Cr, W, Mo, V, Ti, Al, Sn, or Co were prepared and their S-curves determined by dilatometric and microscopic methods. Causes of modification were studied by magnetic and X-ray analysis. Results and conclusions. (N8, AY)

27-N. Decarburized Structures of Steels. (In English.) Keizo Iwasé and Tokuhiko Mochida. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 1, Aug. 1949, p. 93-94.

Certain conclusions were deduced from some experiments on transformations accompanying formation of decarburized structures. Recommendations for avoidance of brittleness during heat treatment of plain carbon steel. (N8, J26, CN)

28-N. Plastic Deformation and Diffusionless Phase Changes in Metals—The Gold-Cadmium Beta Phase. L. C. Chang and T. A. Read. *Journal of Metals,* v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 47-52.

Diffusionless transformation in Au-Cd single crystals containing about 50 atomic % Cd was investigated by means of X-ray analysis of orientation relationships, electrical resistivity measurements, and motion-picture studies of movement of boundaries between new and old phases during transformation. The nucleation of diffusionless transformation by imperfections and the generation of imperfections by diffusionless transformation. 13 ref. (N2, N6, Au, Cd)

29-N. Diffusion of Gases in Metals. Case of the Iron-Hydrogen System. (In French.) Paul Bastien. *Métaux & Corrosion,* v. 25, Oct. 1950, p. 248-262.

A comprehensive theoretical review. Analyzes the adsorption of gas by metals, diffusion of gas into metals, permeability of Fe toward hydrogen, and solubility of gases in metals. 46 ref. (N1, P13, Fe, EG-m)

30-N. Electron-Defraction Study of Cementation of Iron by Carbon Monoxide. (In French.) Jean-Jacques Trillat and Shigueo Oketani. *Métaux & Corrosion,* v. 25, Oct. 1950, p. 263-264.

See abstract under similar title from *Comptes Rendus* (France), item 184-N, 1950. (N8, J28, Fe)

31-N. Transformation Behavior and Hardness Retention of Steels Containing Special Carbide-Forming Alloying Elements, Illustrated by Vanadium Steel as an Example. (In German.) Franz Wever, Adolf Rose, and Walter Peter. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 367-379; disc., p. 379-380.

A comprehensive study, using a vanadium steel containing 0.37% C and 2.2% V, and C-V ratio being such that, at equilibrium, all carbon is combined with V in the form of V_4C_3. Results are summarized in graphs, tables, photomicrographs, and X-ray diffraction patterns. (N8, Q29, AY)

32-N. Observations on the Transformations of Iron and Its Alloys. (In German.) Eduard Houdremont. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 413-422.

Critical correlated review of the literature. Relationships of influence of various elements on the A_3 transformation of Fe to position in the periodic table. 81 ref. (N8, Fe, ST)

33-N. Effect of Alloying Additions on Hydrogen Diffusion Into Iron and a Contribution to Knowledge Concerning the Iron-Hydrogen System. (In German.) Werner Geller and Tak-Ho Sun. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 423-430.

Results of experiments made with pure iron and five different steels to study effects of composition and temperature on hydrogen diffusion. Fe-H constitution diagrams are presented. 33 ref. (N1, M24, Fe)

34-N. The $\beta \rightleftarrows \alpha$ Transformation of Tin; Isomorphism of Gray Tin. (In Russian.) N. A. Goryunova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 1, 1950, p. 51-54.

The above transformation was investigated, particularly the addition of elements which promote it. Data indicate that such elements are very close to each other and to tin in their atomic radii and lattice parameters. Possible practical applications of the results (for example, for storage of pure metallic tin). (N6, Sn)

P

PHYSICAL PROPERTIES AND TEST METHODS

1-P. Remarks on the Note of M. Andre Meyer Concerning the Gyromagnetic Coefficients and Electromagnetic Properties of Iron, Nickel, and Cobalt, and of Some of Their Alloys. (In French.) Samuel Jackson Barnett. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 16, 1950, p. 761-762.

Criticizes two recent notes of Meyer. Existence of a discrepancy between Meyer's and the author's data. (P16, Fe, Ni, Co, SG-p)

2-P. Coercive Field of Separate Grains and of Joined Ferromagnetic Particles. (In French.) Louis Weil. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Oct. 23, 1950, p. 829-831.

Study showed that in separate sufficiently small particles, magnetization varies with rotation of the aggregates of spins. In bulk form, the variation is caused by displacement of Bloch surfaces. The transition of such changes, one into the other, during sintering of powdered metals, was investigated for ferronickel. (P16, Fe-n, Ni, SG-np)

3-P. Method of Determination of Interfacial Tensions at High Temperatures. (In Russian.) S. I. Popel, O. A. Esin, and P. V. Geld. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1097-1100.

Apparatus by which the boundary between liquid metal and liquid slag may be examined by X-ray photography. From the curvature of the boundary, interfacial tension may be calculated. Typical data for several cast-iron—slag compositions are tabulated. 12 ref. (P10, B21, CI)

4-P. The Titanium-Hydrogen System and Titanium Hydride. I. Low-Pressure Studies. Thomas R. P. Gibb, Jr., and Henry W. Kruschwitz, Jr. *Journal of the American Chemical Society*, v. 72, Dec. 1950, p. 5365-5369.

TiH_2 was prepared and its density determined. Dissociation pressure was measured for the Ti-H system over the range 500-800° C., and 50-800 mm. X-ray diffraction patterns were observed for several compositions in the range $TiH_{0.86}$ to TiH_2. A nearly linear relation of density to composition was found from Ti to TiH_2. Ti containing small quantities of interstitial H_2 was found to react rapidly with pure H_2 at room temperature and atmospheric pressure. (P10, Ti)

5-P. Preparation, Stability and Adsorptive Properties of the Carbides of Iron. H. H. Podgurski, J. T. Kummer, T. W. DeWitt, and P. H. Emmett. *Journal of the American Chemical Society*, v. 72, Dec. 1950, p. 5382-5388.

Results of CO and H_2 adsorption studies for the various iron carbides. Preparation and properties of the iron carbides including use of hydrocarbons as carbiding agents, rate of carbiding as a function of surface area, and relative stability of Fe_3C, Hägg Fe_2C, and hexagonal Fe_2C. 16 ref. (P13, C-n, Fe)

6-P. The Anisotropy of Nitrogen Adsorption on Single Crystal Copper Surfaces. T. N. Rhodin, Jr. *Journal of the American Chemical Society*, v. 72, Dec. 1950, p. 5691-5699.

Previously the heat of adsorption on a definite face of a crystal has not been measured because large enough ideal plane surfaces were not available. Suitable single-crystal Cu surfaces which approach flatness on an atomic scale and are composed of a single species of atoms arranged in a well-ordered surface array were successfully prepared and characterized. In order to define effects of various factors for a simple gas-surface system, adsorption isotherms of N_2 at 78.1, 83.5 and 89.2° K on single-crystal and polycrystal surfaces of Cu were determined with a sensitive quartz-beam vacuum micro-balance. 37 ref. (P13, Cu)

7-P. The Heat of Formation of Thorium Tetrachloride. LeRoy Eyring and Edgar F. Westrum, Jr. *Journal of the American Chemical Society*, v. 72, Dec. 1950, p. 5555-5556.

Heats of solution of thorium metal and of $ThCl_4$ in 6 M. HCl were measured. (P12, Th)

8-P. Electrolysis of Aluminum Solutions in a Magnetic Field. Charles E. Wood and C. W. Tittle. *Journal of Chemical Physics*, v. 18, Dec. 1950, p. 1683.

Formation of a molten deposit on the Al anode of an electrolytic cell with a Pt cathode and an electrolyte of aqueous $Al_2(SO_4)_3$ in the presence of a magnetic field of 2000 gauss was reported by Antonoff and Rowley. These experiments were repeated with magnetic inductions up to 8160 gauss under a variety of conditions. In none of the experiments was the molten deposit formed. Corrosion was evident in all cases. (P16, P15, Al)

9-P. An Interferometric Study of Some Optical Properties of Evaporated Silver Films. R. C. Faust. *Philosophical Magazine*, ser. 7, v. 41, Dec. 1950, p. 1238-1254.

Thermally evaporated Ag films were studied in the reflectivity range 4-95%. Air-Ag and glass-Ag reflection and transmission coefficients, corresponding reflection phase changes, and apparent film thickness were measured and compared with those of sputtered Ag films. 14 ref. (P17, Ag)

10-P. Superconductivity of Niobium. L. C. Jackson and H. Preston-Thomas. *Philosophical Magazine*, ser. 7, v. 41, Dec. 1950, p. 1284-1289.

(P15, Cb)

11-P. A Study of the Magneto-Resistance of Silicon-Iron. R. Parker. *Proceedings of the Physical Society*, v. 63, sec. B, Dec. 1, 1950, p. 996-1004.

Fe containing a small percentage of Si in solid solution has an unusually small magneto-resistance. Longitudinal and transverse curves of $\Delta\rho/\rho$ vs. field strength were obtained for a number of single and polycrystalline specimens. It is concluded that the small magneto resistance is due to the small contribution of individual crystallites and not to an averaging-out process. 23 ref. (P16, Fe, SG-p)

12-P. Investigations on the Reversible Susceptibility of Ferromagnetics. R. S. Tebble and W. D. Corner. *Proceedings of the Physical Society*, v. 63, sec. B, Dec. 1, 1950, p. 1005-1016.

Mutual inductometer bridge method developed to measure the above by application of small alternating fields to specimens in the form of long wires. Corrections which must be applied because of finite amplitude of the alternating field and for eddy current effects were investigated with an over-all accuracy of about 1%. Typical results given for Swedish iron show a marked increase in susceptibility after decarburizing and annealing. Relation to the ideas of Néel and the statement of Gans that reversible susceptibility is a unique function of intensity of magnetization and independent of magnetic history of the specimen. 18 ref. (P16, Fe, SG-n, p)

13-P. Deoxidation; Thermodynamic Principles and Equilibria. F. D. Richardson. *Iron and Steel*, v. 23, Nov. 28, 1950, p. 430-432; disc., p. 466-470.

See abstract of "The Thermodynamic Background of Iron and Steelmaking Processes. II. Deoxidation," *Journal of the Iron and Steel Institute*, item 358-P, 1950. (P12, D general, ST)

14-P. Contribution to the Electron Emission of Metal Oxides, Alloys, and Metal Carbides. (In German.) Erich Krautz and Günter Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft*, v. 2, 1950, p. 192-198.

On the basis of the formula for thermionic electron emission, a linear relation between average value of work function and temperature of optimum thermionic emission is derived. Alloys of Cr, especially with Fe and Ni, show decomposition for higher temperatures caused by evaporation and migration of Cr on the emitting surface. Thermionic emission of the metal carbides is much smaller than that of the alkaline earth oxides and is diminished by oxidizing processes during heating of the cathodes. (P15, C-n, Cr, Fe, Ni)

15-P. Electrochemical Behavior of Iron in Solutions of Oxidizing Agents. I. Electrode Potentials of Iron in Solutions of Oxidizing Agents. (In Russian.) L. Ya. Gurvich and G. V. Akimov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 457-464.

Electrode potentials were determined in 0.0001-0.1 *N* HNO_3 solutions, and in solutions of KNO_3, $K_2Cr_2O_7$, $KMnO_4$, and $(NH_4)_2S_2O_8$. Influence of ferric ions on electrode potentials of Fe. Method of investigation and data. (P15, Fe)

16-P. Solubility of the Elements of Mendeleev's Periodic System in Nickel. (In Russian.) I. I. Kornilov. *Izvestia Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of USSR), Section of Chemical Sciences, Sept.-Oct. 1950, p. 475-484.

Relationships of atomic diameters, lattice type, and location of the elements in the periodic system. Possibility of forecasting the formation of solid solutions of elements with Ni on the basis of position in the periodic table. 34 ref. (P10, N12, Ni)

17-P. Thermal Insulating Properties of Carbonized Corkboard and Layered Metal Sheets at Low Temperatures. (In English.) Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Aug. 1949, 107-110.

Experiments were made as an aid in design of cold-storage structures of corkboard, laminated Al, or Sn sheets. Apparatus, method, and data. (P11, T10, Al, Sn)

18-P. Solidification Shrinkage of Some Aluminum Alloys. (In Japanese.) S. Torii. *Journal of the Casting Institute of Japan*, v. 22, no. 9, 1950, p. 7-13.

Linear rates of solidification shrinkage of pure Al and Al alloys were measured. An equation represents these rates and relative order of magnitude. Method for calculation of thermal coefficient of expansion from corrected melting points. (P10, Al)

19-P. Effect of Heat Treatment on the Electrical Properties of Germanium. H. C. Theuerer and J. H. Scaff. *Journal of Metals*, v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 59-63.

Ge may be reversibly converted from *n* to *p* type by heat treatment. Data for the conversion and associated changes in resistivity. Results are interpreted in terms of changes in donor-acceptor balance. (P15, Ge)

20-P. Grain Boundary Effect in Surface Tension Measurement. Harry Udin. *Journal of Metals*, v. 191, Jan. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 63.

Surface tension of solid Cu was determined by the writer and associates in 1948. It was assumed that grain-boundary energy in a pure metal was very small in comparison to energy of an external surface. Accordingly, internal surface energy of the coarse-grained specimens was neglected. Since that time, experimental evidence has accumulated showing that grain-boundary energy is generally about one-third of the energy of an external surface. Develops equation for evaluation of grain-boundary energy. (P10)

21-P. Magnetism and the Magnetic Anneal. J. P. Martin. *Steel Horizons*, v. 13, Winter 1950-51, p. 8-9, 18.

Fundamental principles of magnetism and the magnetization process. Improvements in properties of magnetic alloys produced by annealing in a magnetic field. (P16, J23, SG-n,p)

22-P. Studies of the Propagation Velocity of a Ferromagnetic Domain Boundary. H. J. Williams, W. Shock-

ley, and C. Kittel. *Physical Review,* ser. 2, v. 80, Dec. 15, 1950, p. 1090-1094.

Experimental results on propagation velocity in a crystal of silicon iron with a simple domain structure. 14 ref. (P16, Fe)

23-P. On the Mechanism of Impurity Band Conduction in Semiconductors. Cavid Erginsoy. *Physical Review,* ser. 2, v. 80, Dec. 15, 1950, p. 1104-1105.

Hung and Gliessman have reported on the anomalous low-temperature behavior of the resistivity and the Hall coefficient of Ge. Similar anomalies have been observed in SiC by Busch and Labhart. Reports work on SiC, and attempts to interpret results of the last authors on the basis of a conduction mechanism in an impurity band formed by interaction of excited impurity states at high concentrations. It is believed that the proposed model can explain deviations of Ge from Hung's calculated values. (P15, Ge)

24-P. Hall Coefficient and Resistivity of Evaporated Bismuth Layers. W. F. Leverton and A. J. Dekker. *Physical Review,* ser. 2, v. 81, Jan. 1, 1951, p. 156-157.

Results of measurement and their theoretical interpretation. (P15, Bi)

25-P. Ferromagnetism: Magnetization Curves. Edmund C. Stoner. *Reports on Progress in Physics,* v. 13, 1950, p. 83-183.

Reviews work since 1934 on the variation with field of the magnetization of ferromagnetics and associated phenomena. 227 ref. (P17, SG-n, p)

26-P. The Spectral Emittance of Nickel and Oxide-Coated Nickel Cathodes. S. L. Martin and G. F. Weston. *British Journal of Applied Physics,* v. 1, Dec. 1950, p. 318-324.

Spectral-emittance values at 0.66μ were measured for various types of oxide-coated cathodes and for nickel cores, using a cylindrical diffuse reflectometer. The influence of various factors, essentially affecting surface condition, on emittance, was examined. Tables show, for nickel, the effect of stoving treatment, temperature, and getter flash; and, for oxide-coated cathodes, the effect of oxide-surface texture, and subsidiary effects of glass-tube baking temperature, and getter flash. 21 ref. (P17, Ni)

27-P. Magnetic Behavior of Solid Solutions of Copper With Cobalt and FeNi Alloy. (In French.) André J. P. Meyer and Pierre Taglang. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 6, 1950, p. 956-958.

Absolute magnetic momenta and Curie points of above ferro-magnetic solid solutions were determined using special apparatus. Anomalous behavior of the Cu-Co solid solution was observed. Data and method of investigation. (P15, Cu, Fe, Ni)

28-P. Simultaneous Determination of Optical Constants and Thickness of Very Thin Metallic Films. (In French.) Florin Abeles. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 231, Nov. 6, 1950, p. 958-960.

Calculation method for determining thickness from factors of reflection and transmission of light. (P17, S14)

29-P. Remarks Concerning the Eötvos Law and the Surface Tension of Solid and Liquid Metals. (In French.) J. Friedel and C. Crussard. *Journal de Chimie et de Physico-Chimie Biologique,* v. 47, Sept.-Oct. 1950, p. 733-739.

Attempts were made to apply the law governing the surface tension of nonmetallic liquids to liquid metal (experimentally) and solid metal (theoretically). By comparing surface-tension values to those for energy of cohesion, a constant ratio was found to exist. 18 ref. (P10)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

1-Q. The Flow and Fracture of Metals. *Welding Journal,* v. 29, Dec. 1950, p. 623s.

A selected bibliography of comprehensive treatises prepared by Materials Division, Pressure Vessel Research Committee, Welding Research Council. 15 ref. (Q24, Q26)

2-Q. Weldcracking and Blue-Brittleness. L. W. C. Gaymans. *Welding Journal,* v. 29, Dec. 1950, p. 623s-624s.

Speculates on mechanism of the above in mild steel and their relationship. (Q23, K9, CN)

3-Q. Effect of Nuclear Radiation on Metal. D. S. Billington and Sidney Siegel. *Metal Progress,* v. 58, Dec. 1950, p. 847-852.

Certain theoretical predictions are checked by experiments on some pure metals and some common alloys, wherein their hardness, modulus of elasticity, and electrical resistance are compared, before and after irradiation. Work was done on Al, Cu, Cu-Au, Cu-Be, stainless steel, Monel, and other materials. An increase in hardness always resulted from considerable exposure. (Q29, Q23, P15)

4-Q. Creep of Copper. *Metal Progress,* v. 58, Dec. 1950, p. 900, 902. Condensed from "Creep of High-Purity Copper", William D. Jenkins and Thomas G. Digges.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 657-Q, 1950. (Q3, Cu)

5-Q. How Can Hardness Values Be Used in Metal Design? John B. Campbell. *Material & Methods,* v. 32, Dec. 1950, p. 43-47.

Limitations of use of hardness data in metals selection and design work. Differences between the various hardness test procedures. General limitations; hardness vs. strength, wear resistance, machinability, and formability. (Q29)

6-Q. Comparison of Fatigue Strengths of Bare and Alclad 24S-T3 Aluminum-Alloy Sheet Specimens Tested at 12 and 1000 Cycles Per Minute. Frank C. Smith, William C. Brueggeman, and Richard H. Harwell. *National Advisory Committee for Aeronautics,* Technical Note 2231, Dec. 1950, 18 pages.

Results of axial fatigue tests conducted on 0.032-in. thick flat sheet specimens to determine the effect of frequency of loading on fatigue strengths. (Q7, Al)

7-Q. Influence of Microstructure on the Hot Strength of Steel. Georges Delbart and Michael Ravery. *Metal Treatment and Drop Forging,* v. 17, Autumn 1950, p. 171-186, 188. Translated.

Previously abstracted from *Revue de Métallurgie* under similar title. See item 361-Q, 1950. (Q3, M27, AY)

8-Q. Influence of the Rate of Loading of the Test Machine on Characteristics of Malleable Cast Iron. (In French.) Jean Gelain. *Fonderie,* Oct. 1950, p. 2205-2208.

Investigated for rates of load application varying from 0.16 to 2.15 kg. per sq. mm. per sec. An Amsler test machine of 10 tons capacity was used. Tabulated and charted data indicate that rate of loading has negligible effect on tensile strength. (Q27, CI)

9-Q. Notes on Transverse Mechanical Properties of Forgings. (In Italian.) Aldo Bartocci. *Metallurgia Italiana,* v. 42, Aug.-Sept. 1950, p. 289-296.

Results of statistical analysis of data on special heat treated steels, including influence of various factors such as dendritic structure, shape of ingots, forging sequence, and process by which the steel was made. (Q general, F22, CN)

10-Q. Influence of Position in the Periodic Table on the Effect of Elementary Additions on the Mechanical Properties of Copper, Silver, and Gold. (In Russian.) B. B. Gulyaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 21, 1950, p. 1089-1092.

Attempts to develop rules for above influence, as an aid in predicting properties obtainable by adding different elements. Relationships are shown graphically. (Q general, Cu, Ag, Au)

11-Q. The Workability of Steel. (In Czech.) Slavoj Todl. *Hutnické Listy,* v. 5, June 1950 (Supplement), p. 85-98.

Results of extensive experimental study of the effects of various factors on workability. Appearance of intercrystalline fractures parallel to the grain boundaries and their relationship to melting and ingot-casting technique and to heat treatment. (Q23, Q24, ST)

12-Q. How Furnace Moisture Causes Embrittlement. C. A. Zapffe. *Iron Age,* v. 166, Dec. 28, 1950, p. 60-65.

See abstract of "Embrittlement of Stainless Steel by Steam in Heat Treating Atmospheres," C. A. Zapffe and R. L. Phebus, *American Society for Metals,* Preprint No. 25, 1950, item 733-Q, 1950. (Q23, J2, SS)

13-Q. Plastic Flow of Platinum Wires. R. P. Carreker, Jr. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1289-1296.

Strain-time behavior of annealed Pt wires at constant stress and temperature is reported for a wide range of experimental conditions: 78-1550° K., 900-40,000 psi., 0.001-0.1 strain, and 10^{-1} to 10^{-6} min. strain rate. Equations which describe the results satisfactorily. 14 ref. (Q24, Pt)

14-Q. An Approximation Method for the Determination of the Elastic Constants of Cubic Single Crystals. J. R. Neighbours and Charles S. Smith. *Journal of Applied Physics,* v. 21, Dec. 1950, p. 1338-1339.

Calculation procedure. (Q21)

15-Q. Effects of Prior Static and Dynamic Stresses on the Fatigue Strength of Aluminum Alloys. John A. Bennett and James L. Baker. *Journal of Research of the National Bureau of Standards,* v. 45, Dec. 1950, p. 449-457.

Tests on Alclad 24S-T sheet showed that prior static load has a marked effect on fatigue strength in unidirectional bending when the stress amplitude is relatively small. From tests on bare 24S-T sheet, it was found that a few cycles at a stress amplitude of 17,000 psi. resulted in a large increase in the fatigue life at 20,000 psi. Damage tests for other combinations of stress amplitudes indicated that damage was nearly a linear function of ratio of the number of cycles at a given stress to the number that would cause failure at that stress.

A new design of specimen and a new form of S-N diagram.
(Q7, Al)

16-Q. Problems in the Analysis of Growth and Wear Curves. G. E. P. Box. *Biometrics*, v. 6, Dec. 1950, p. 362-389.

In a number of different fields of application, sets of growth and wear curves must be analyzed. Methods of analysis which have been found useful, what assumptions are being made, and how these assumptions can be tested. Examples from growth of laboratory animals and from wear of coated fabrics and of tire treads. 22 ref. (Q9)

17-Q. Experiments for the Determination of the Influence of Residual Stresses on the Fatigue Strength of Structures. M. Ros. *Welding Research*, v. 4, Oct. 1950. (Bound with *Transactions of the Institute of Welding*, v. 13), p. 83r-93r.

Tests on structural parts into which stresses were introduced in different ways as follows: flat-plate specimens with drilled holes and with fitted or shrunk-in plugs or pressed-in conical dowels; flat specimens machined all over, cross-section 100 by 20 mm., with a bore of 20 mm. diameter in the center of the specimen with and without enlargement hole by pressing; pairs of flat specimens subjected to internal restraint; cold straightened rectangular test pieces originally severely curved; welded-in plugs machined all over, not heat treated; and flat specimens with and without single weld beads deposited on one of the edges of the specimen. Conclusions. (Q25, Q7)

18-Q. Cold Work; Effect on Certain Properties of Steel. J. H. Andrew, H. Lee, and others. **Sec. II. Effect of Cold Work Upon Electrical Resistivity in Steel.** J. H. Andrews, H. Lee, P. L. Chang, and R. Guenot. **Sec. III. An X-Ray Investigation of Internal Stresses in Cold-Drawn Steel.** J. H. Andrew and P. E. Brooks. **Sec. IV. Effect of High-Speed Deformation on Steel.** J. H. Andrew and L. Bourne. **Sec. V. An X-Ray Investigation of Structural Changes in Steel Due to Cold-Working.** D. V. Wilson. **Sec. VI. Effect of Cold-Work on Hydrogen in Steel.** J. H. Andrew, U. V. Bhat, and H. K. Lloyd. **Sec. VII. General Discussion.** *Iron and Steel*, v. 23, Nov. 28, 1950, p. 438-455; disc., p. 471-472.

See abstracts from *Journal of the Iron and Steel Institute*, items 460-Q and 629-Q, 1950.
(Q23, Q24, Q25, P15, ST)

19-Q. Fatigue Properties of Helical Springs for I. C. Engine Valve Springs and Other Duties. B. M. Pearson. *Wire Industry*, v. 17, Dec. 1950, p. 987-989.

Reviews recent German and American articles covering tests on nonalloyed helical springs at room temperature, on alloyed helical valve springs at room temperature, on alloyed and unalloyed springs at moderately elevated temperatures, and on fatigue strength of helical springs of various ferrous materials and finishes and at elevated temperatures. (Q7, T7, CN, AY)

20-Q. Fatigue-Bending Strength and Wear Resistance of Gear Wheels. (In German.) Heinz Glaubitz. *Archiv für technisches Messen*, Nov. 1950, p. T126 (2 p.)

Several methods for determining the mechanical properties of gear teeth. Wear resistance is determined by "running tests", subjecting the gears being tested to increasing loads. Special equipment is used to measure wear due to gear shifting. 12 ref. (Q9, Q7)

21-Q. Experimental Determination of the Difference Between Isothermal and Adiabatic Values of Young's Modulus for Aluminum. (In Italian.) I. Barducci. *Alluminio*, v. 19, No. 5, 1950, p. 416-418.

Indirect method based on measurements of internal elastic-energy losses, which according to the Zener theory depend solely on the difference of the indicated isothermal and adiabatic values. (Q23, Al)

22-Q. New Methods for Testing Antifriction Alloys. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), Sept. 1950, p. 107-109.

Summarizes the work of Khrushchov in developing methods and apparatus to test the properties of new low-tin or tin-free bearing alloys to replace high-Sn babbitt in automobile and tractor bearings. A general theory of antifriction properties is developed. (Q9, SG-c)

23-Q. Deformability of Magnesium Alloys. (In Russian.) S. I. Gubkin and M. I. Zatulovskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1537-1549.

Experimental investigation on alloys containing 3.60% Al, 0.50% Zn, 0.20% Mn, balance Mg; and 6.50% Al, 1.00% Zn, 0.20% Mn, balance Mg demonstrated that repeated preliminary hot working consisting of upsetting on a press to a degree of deformation not lower than 0.7 considerably increases index of plasticity and temperature range of deformation. Optimum temperature conditions for such hot working. A deformability diagram.
(Q23, G1, Mg)

24-Q. Impact, Tensile and Hardness Tests of Some Ferrous Alloys, Including the Welded Parts, at Low Temperatures. (In English.) Tadao Fukuroi, Gohei Monna, Naomichi Ishii, and Yasuo Okamatsu. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 1, Aug. 1949, p. 101-105.

Previously abstracted from condensed version in *Engineers' Digest*. See item 717-Q, 1950.
(Q27, Q29, Q6, AY, CN)

25-Q. On the Discontinuous Elongation of Aluminium Crystal. (1) (In English.) Tomoyoshi Kawada. *Journal of Mechanical Laboratory*, v. 4, Mar. 1950 (Special No.), p. 26-31.

Experimental apparatus and procedure. Discontinuity in the elongation curve is believed to be due to presence of impurities. (Q23, Al)

26-Q. Study on Wear Phenomena of Steel Against Soil. I. (In Japanese.) Tetsutaro Mitsuhashi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory*, v. 4, May 1950, p. 91-96.

Work done to aid in improvement of agricultural and earth-moving machinery. A new apparatus designed for this research. Certain conclusions are summarized.
(Q9, T3, T4, ST)

27-Q. High-Stress Fatigue of Alloy Steels. T. T. Oberg and W. J. Trapp. *Product Engineering*, v. 22, Jan. 1951, p. 159, 161, 163.

Recent tests were made to determine the fatigue strength of three aircraft steels by means of reversed bending and axial loading. Rate of loading was varied between 90 and 3450 cycles per min. Results of these tests are shown graphically. The steels were SAE 2330, 4340, and 8630. (Q7, AY)

28-Q. On Thermal Stresses, Strains, and Warping. F. H. Murray and G. Young. *U. S. Atomic Energy Commission*, AECD-2960, May 17, 1944, 7 pages.

A mathematical analysis. (Q25)

29-Q. The Effect of Boron on Cast Iron. *Canadian Metals*, v. 13, Dec. 1950, p. 26, 28. Based on "Effect of Boron on the Structure and Some Physical Properties of Plain Cast Irons", Alexander I. Krynitsky and Harry Stern.

Previously abstracted from *Journal of Research of the National Bureau of Standards*. See items 3B-139 and 3B-67, 1949. (Q general, M27, CI)

30-Q. Portable Hardness Tester for Gears. *Machinery* (London), v. 77, Dec. 21, 1950, p. 676-677.

Apparatus which gives Vickers hardness data on large gears, where use of the standard test equipment is impossible. (Q29)

31-Q. Piston Assemblies for Road Transport Oil Engines. J. L. Hepworth. *Institution of Mechanical Engineers, Proceedings* (Automobile Division), pt. 2, 1949-50, p. 69-76; disc., p. 76-87.

The usual types of piston failures such as breakage, seizure, ring sticking, land breakage, land scuffing, and groove destruction, and means for their avoidance. Examination of rates of wear of various components leads to the conclusion that the top compression ring is the weakest point. Service-test results with different piston-ring materials, and suggestions for improved materials. Cr-plated rings gave the best results. Recommendation for use of 12% Si alloy and for an adequate path for heat flow from the piston crown to the ring zone.
(Q9, S21, CI, Cr, AY)

32-Q. Some Factors Governing the Performance of Crankcase Lubricating Oils. A. Towle. *Institution of Mechanical Engineers, Proceedings* (Automobile Division), pt. 2, 1949-50, p. 88-98; disc., 98-111.

In addition to basic requirements of a crankcase oil deals with engine wear and bearing failures.
(Q9, SG-c)

33-Q. The Phenomenon of Wear; A Practical Device for Testing Abrasion. N. G. Neuweiler. *Microtechnic*, (English Edition.) v. 4, Sept.-Oct. 1950, p. 283-287. (Translated from the German.)

The phenomena of friction; effective contact surface; surface temperature of sliding bodies; polishing of solids; coefficient of friction; and wear. (To be continued.) (Q9)

34-Q. Variation of Microhardness of Monocrystals With Orientation of the Pyramidal Indenter. (In French.) Henri Roth-Meyer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 231, Oct. 30, 1950, p. 906-908.

Investigated using a Vickers indenter on 99.99% Al and 99.97% Zn crystals. Concludes that the pyramidal indenter is more sensitive than a conical or a spherical indenter. How it may be used to determine variation in hardness due to anisotropy from shape of the imprint, and to determine orientation of crystal faces from slip lines.
(Q29, M23, Al, Zn)

35-Q. Influence of Chemical Composition on Strength Properties of Structural Steels. (In Italian.) Raffaello Zoia. *Metallurgia Italiana*, v. 42, Oct. 1950, p. 357-361.

A formula previously established for relationship of tensile strength and chemical composition of structural steels, for tempering temperatures up to 600° C., was extended to higher temperatures and shows that each element has an individual effect, without reciprocal action, on tensile strength. For equal carbon contents, the curves for different amounts of other elements are parallel to each other. (Q23, CN)

36-Q. Formula for Calculation of Tensile Strength as a Function of Carbon and Manganese Content; and a Nomogram for Its Graphical Calculation. (In Italian.) Aurelio Palazzi. *Metallurgia Italiana*, v. 42, Oct. 1950, p. 361-365.

While many formulas are given in the literature, their specific applicability is often in doubt. A method by which a formula suitable for any particular case can be determined, including its limits of error. This method is illustrated by an example in which C and Mn contents of steel are the variables. However, the method may be readily extended to other cases. 20 ref. (Q27, ST)

37-Q. Research on the Effects of Nickel Additions to Cast Tin and Lead-Tin Bronzes. (In German.) A. H. F. Goederitz. *Metall,* v. 4, Dec. 1950, p. 495-498.

Mechanical properties and microstructures of these bearing metals were studied and compared with those of Mn-Si bronze. Results show increased hardness and elongation as well as improved bearing properties. (Q general, M27, Cu, SG-c)

38-Q. Effect of Superheating on the Fatigue-Bending Strength of Aluminum-Copper-Magnesium Alloys. (In German). P. Brenner. *Metall,* v. 4, Dec. 1950, p. 502-504.

Experiments with two Al-Cu-Mg alloys (about 95% Al) showed that superheating reduced their static as well as dynamic strength properties. Photomicrographs show effects on structures. (Q7, Q5, Al)

39-Q. Stress Distribution in Notched Impact Specimens. (In German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 403-411.

Experiments were made with two carbon steel and one soft iron impact specimens to study the three-dimensional stress conditions which more or less prevent plastic deformation and thus result in fracture. Methods of determining plastic deformations and of calculating stresses at the bottom of the notch, and effects of specimen width on tendency to fracture. 19 ref. (Q6, Q25, ST, Fe)

40-Q. Correlations Between Stress Gradients and Deformation. Part I. Retarding Plastic Deformation. (In German.) Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen,* v. 21, Nov.-Dec. 1950, p. 431-436.

Shows, by theoretical analysis, the invalidity of Kick's law of similarity in certain cases; for instance when in multicrystalline metals with nonuniform stress distribution of stress and deformation, one part of the cross section exceeds the limit of elasticity. 10 ref. (Q25)

41-Q. Strength of Tooth Roots of Straight Toothed Steel Spur Gears. (In German.) G. Niemann and H. Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Nov. 21, 1950, p. 923-932.

Results of mechanical testing and photo-elastic stress analyses showing the effects of tooth shape, material, core hardness and other factors. (Q25, T7)

42-Q. Periodicity of the Influence of Additions on the Mechanical Properties of Metals. (In Russian.) B. B. Gulyaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 1, 1950, p. 25-28.

Attempts to correlate position in the periodic table with influence of elementary additions on mechanical properties of Mg, Zn, Cd, Al, Sn, Pb, Fe, Ni, Pd, and Pt. Only binary alloys in the annealed condition were considered. 15 ref. (Q general)

43-Q. Relationship of Creep of Austenitic Alloys to Their Phase Diagrams. (In Russian.) A. M. Borzdyka. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 75, Nov. 1, 1950, p. 37-38.

Investigated for 12 binary and 34 ternary alloys of the Fe-Cr-Ni system at 600 and 700° C. Particular emphasis was placed on the γ solid-solution region. Results are plotted on the phase diagram of the system. (Q3, M24, Fe, Cr, Ni)

44-Q. Plastic Deformation of Electropolished Brass Surfaces. (In Czech.) Ferd Kralik and C. Ivo Zadny. *Hutnicke Listy,* v. 5, Oct. 1950, p. 412-414.

Plastic deformation was studied for α and $\alpha+\beta$ brasses. Photomicrographs illustrate results obtained. (Q24, Cu)

45-Q. (Book) **The Friction and Lubrication of Solids.** F. P. Bowden and D. Tabor. 337 pages. Oxford University Press, Amen House, Warwick Square, London E.C.4, England. 35s.

Investigations conducted into the physical processes, and into some of the chemical processes, that occur during the sliding of solids, also into the mechanism of friction and boundary lubrication. Chapters deal with the action of bearing alloys and the mechanism of metallic friction. (Q9)

R

CORROSION

1-R. Developments in Coatings and Cathodic Protection. Carlton L. Goodwin. *Petroleum Engineer,* v. 22, Dec. 1950, p. D35-D37.

Improvements in external corrosion control of underground pipe and possibilities of further reduction of corrosion losses. (R10, CN, CI)

2-R. Resistance to Attack by Liquid Metals. LeRoy R. Kelman, Walter D. Wilkinson, and Frank L. Yaggee. *Metal Progress,* v. 58, Dec. 1950, p. 868-B. From "Liquid Metals Handbook", Office of Naval Research Publication NAVEXOS P-733.

A graphical presentation. Resistance of each solid metal or alloy is given at 300 and 600° C. Qualitative degree of resistance is shown for 16 liquid metals in contact with 30 solid metals at the two temperatures. (R6)

3-R. Alloy Steel Valve Casting Unimpaired After 6 Years' Service. *Steel,* v. 127, Dec. 25, 1950, p. 66. (From paper by T. N. Armstrong and R. J. Greene.)

Results of study indicate no loss of strength, no embrittlement, and no occurrence of graphite in the welded valve casting of Ni-Cr-Mo steel, of approximately WC-4 grade, after exposure to steam at 900° F. for a period of 6 years. (R4, T7, AY)

4-R. Use of Magnesium Alloy Anodes in Ship Protection. K. N. Barnard. *Canadian Journal of Research,* v. 28, sec. F, Nov. 1950, p. 417-437.

See abstract of "Cathodic Protection of an Active Ship in Sea Water," K. N. Barnard and G. L. Christie, *Corrosion;* item 246-R, 1950. (R10, T22, Mg)

5-R. The Corrosion of Steel by Sea Salt of Given Moisture Content. S. J. Duly. *Journal of the Society of Chemical Industry,* v. 69, Oct. 1950, p. 304-306.

Extent of corrosion of mild steel by sea salt is governed by relative humidity of the ambient air. Keeping the moisture content of the salt-complex at 8% or less substantially prevents corrosion from this cause. (R4, CN)

6-R. Heating of Nickel Alloys; Susceptibility to Attack by Sulphur. *Chemical Age,* v. 63, Dec. 2, 1950, p. 783.

(R6, Ni)

7-R. The Oxide Film on Aluminium; Consideration of Experimental Facts. G. Tolley. *Metal Industry,* v. 77, Dec. 8, 1950, p. 255-258.

Protective nature has been definitely established, but there is still insufficient knowledge as to kinetics of formation, and of properties under various conditions. Indicates that a more detailed knowledge of the Al_2O_3 film would give a greater insight into the mechanism of oxidation of metals. 23 ref. (R2, L19, Al)

8-R. Measurement of Potentials in Corrosion Research. (In German.) G. Masing. *Werkstoffe und Korrosion,* v. 1, Nov. 1950, p. 433-437.

Examples and graphed data to show how a simple but systematic study of the potentials of a given metal electrode in an electrolyte can materially aid in understanding of the reactions occurring at the electrode; and, hence, the corrosive behavior of the metal. (R1)

9-R. Corrosion Protection in Cellar Storage. (In German.) H. Netz. *Werkstoffe und Korrosion,* v. 1, Nov. 1950, p. 444-446.

Practical suggestions for prevention of corrosion of metal parts in beverage storage cellars. (R3)

10-R. Corrosion of Preheater Tubes. (In German.) W. Katz. *Metalloberfläche,* sec. A, v. 4, Nov. 1950, p. 161-168.

Causes of corrosion of tin-bronze and aluminum-bronze tubes carrying salt solutions and externally heated with superheated steam were investigated. Corrosion of tin-bronze tubes is explained by the formation of local galvanic currents, while the intergranular corrosion of aluminum-bronze tubes is caused by tensile stresses resulting from the high temperatures of the steam. 10 ref. (R4, Cu)

11-R. Drill Pipes and Tool Joints Undergo Rigid Tests for Fatigue. William S. Bachman. *Drilling,* v. 12, Dec. 1950, p. 20-21, 78.

Both ordinary fatigue and corrosion fatigue, the latter being responsible for most service failures. Results from fatigue tests on full-size, 4½-in., drill-pipe connections. Factors which affect fatigue strength of a drill-pipe connection, and a sample fatigue-strength problem to demonstrate how the higher fatigue-stress values of the newer type connections have practically eliminated failures at tool joints. (R1, Q7, AY)

12-R. The Effect of Copper Undercoats on the Protective Value of Nickel-Chromium Coatings on Steel. B. B. Knapp and W. A. Wesley. *Plating,* v. 38, Jan. 1951, p. 36-38, 45-48, 53-56.

Corrosion tests on panels of high-carbon steel plated with Ni-Cr and with Cu-Ni-Cr showed that composite coatings containing a considerable proportion of Cu were decidedly inferior to Cu-free coatings of equal thickness in normal and salt-containing industrial atmosphere and in a salt-spray test. Both Cu and Fe corrosion products accelerate corrosion of Ni-Cr coatings. A thin coating of Cu under the Ni had a beneficial effect only in the early stages of the atmospheric tests. 12 ref. (R3, Cu, Ni, Cr, ST)

13-R. Corrosion and Corrosion Testing in the Pulp and Paper Industry. R. A. Huseby and M. A. Scheil. *Tappi,* v. 33, Mar. 1950, p. 138-148.

General corrosion, pitting, intergranular attack, stress corrosion cracking, galvanic corrosion, dezincification, and erosion-corrosion, with examples from the pulp and paper industry. Appropriate remedial measures such as alloy selection and heat treatment. The pro-

nounced effect of carbon content on pitting tendency in both laboratory and field tests. Increased corrosion resistance in the ammonium bisulfite process can be effected by keeping Cr content of Type 316 analyses on the high side. Metallurgical considerations in fabrication of alloy-lined equipment. (R1, R2, T29, SS)

14-R. Digester Corrosion; Experience of a Sulphate Mill. Thomas C. Johnson. *Tappi*, v. 33, Oct. 1950, p. 481-484.

A study of corrosion problems experienced in 20 digesters. Although original digester service was 12-14 years, newer digesters installed in 1947 and 1948 appear to be corroding so rapidly that a life of 3-5 years is all that can be expected. Methods for measuring rate of corrosion and inspecting digesters. The steel involved contains 0.30% C, 0.80% Mn, 0.035% P, 0.04% S, and 0.35% Cu. (R5, T29, CN)

15-R. New Corrosion Testing Station. *Marine Engineering and Shipping Review*, v. 56, Jan. 1951, p. 62-65.

New Kure Beach, N. C., station of International Nickel Co. (R11)

16-R. Cathodic Protection at Imperial Dam. Joseph P. Collopy and Waldo D. Freeman. *Engineering News-Record*, v. 146, Jan. 4, 1951, p. 43-44.

System used to prevent corrosion of metallic sections of desilting basins and diversion channels. (R10, ST)

17-R. First Published Kraft Industry Report: Digester Corrosion. Francis W. Flynn. *Pulp & Paper*, v. 25, Jan. 1951, p. 34-35.

Experiences of various companies. Present knowledge and proposed cooperative research. (R5, T29, SG-g)

18-R. The Mechanism of Inhibition of the Corrosion of Iron by Sodium Hydroxide Solution. J. E. O. Mayne, J. W. Menter, and M. J. Pryor. *Journal of the Chemical Society*, Nov. 1950, p. 3229-3236.

When iron, freed from its original oxide film, is immersed in 0.1 *N* NaOH, containing dissolved oxygen, it becomes covered with a thin film of $\gamma\ Fe_2O_3$. It is believed that this film is responsible for passivity and results from a heterogeneous reaction between O_2, dissolved in the solution, and the iron. A deaerated solution of 0.1 *N* NaOH attacks Fe very slowly. (R10, Fe)

19-R. The Corrosion of Iron Covered by a Thin Film of Neutral Salt Solution. W. I. Whitton. *Transactions of the Faraday Society*, v. 46, Nov. 1950, p. 927-938.

Using ½ *N* NaCl solutions and an oxygen atmosphere unusual results are obtained, due to the combined effect of high electrical conductivity of the liquid film and an unrestricted supply of oxygen. Results indicate that acceleration of corrosion of the "oxygen absorption" type may be caused by the catalytic effect of certain impurities themselves, and not necessarily of oxide films, on oxygen depolarization action. Several of the results obtained differ from those found for specimens corroding in a restricted supply of oxygen. A simple apparatus for industrial testing. 19 ref. (R2, Fe)

20-R. Solubility and Volatility of Aluminum in Aqueous Solutions or in a Stream of Water Vapor. (In German.) R. Strohecker and Fr. Matt. *Fresenius' Zeitschrift für analytische Chemie*, v. 131, no. 5, 1950, p. 334-341.

Experimentally studied by dissolving Al and several of its compounds in tap water, distilled water, and dilute solutions of NaCl, acetic, tartaric, citric, and oxalic acids. The effect of boiling in the solvent in open and in closed vessels was also investigated. 10 ref. (R4, R5, Al)

21-R. Photoelastic Study of Stresses in Matthaes Test Specimen Developed for Investigation of Corrosion Under Stress. (In Italian.) W. Ruff. *Alluminio*, v. 19, no. 5, 1950, p. 411-415.

Photo-elastic stress-analysis technique. Comparative investigation of "Superavional D" (an Al alloy) by this method and by a tensiometric method showed excellent agreement. (R1, Q25, Al)

22-R. An Electron Diffraction Study on the Corrosion of Metals. (In English). Shigeto Yamaguchi. *Japan Science Review*, ser. 1, v. 1, Mar. 1949, p. 24-31.

Experimental results obtained on a variety of metals over a period of several years are summarized. 10 ref. (R general, M21)

23-R. Corrosion Resistance of a Copper Alloy Containing Chromium. (In Japanese.) Tetsutaro Mitsuhashi and Manabu Ueno. *Journal of Mechanical Laboratory*, v. 4, Mar. 1950, p. 50-53.

Data for alloys containing 65-90% Cu, 5-20% Ni, and 5-25% Cr. (R general, Cu)

24-R. Combating Corrosion in a Chemical Plant With Magnesium Anodes. Oliver Osborn. *Corrosion* (Technical Section), v. 7, Jan. 1951, p. 2-9.

Cathodic protection of steel and cast iron in a chemical plant is economically justified and feasible from an engineering point of view under certain conditions. Specific information concerning practice at Dow Chemical Co.'s Freeport, Texas, plant. (R10, ST, CI)

25-R. Corrosion Inhibitors for Steel. W. G. Palmer. *Corrosion* (Technical Section), v. 7, Jan. 1951, p. 10-19. Reprinted from *Journal of the Iron and Steel Institute*. See item 3-R, 1950. (R10, ST)

26-R. Internal and External Corrosion Experience in Shell's Products Pipe Lines. S. S. Smith, W. J. Curry, and E. H. Rush. *Corrosion*, (Technical Section), v. 7, Jan. 1951, p. 20-27; disc., p. 27-28.

Summarizes 10 years of experience on two product lines using alkaline aqueous $NaNO_2$ as an internal corrosion inhibitor. Figures show short- and long-time effect of nitrite inhibition. Use of Mg anodes as an external corrosion preventative on a products pipe line. Field tests conducted before anodes were installed, after anodes were installed, and over several years of life of anodes. Concludes that proper field testing and installation of Mg anodes can control destructive corrosion sufficiently to extend the useful life of uncoated pipe lines to approximately double their unprotected life. (R10, CN)

27-R. Corrosion Fatigue; The Influence of Disarrayed Metal. D. Whitwham and U. R. Evans. *Corrosion* (Technical Section), v. 7, Jan. 1951, p. 28-40.

Previously abstracted from *Journal of the Iron and Steel Institute*, item 207-R, 1950. (R1, CN)

28-R. Fatigue Testing and Development of Drill Pipe to Tool Joint Connections. William S. Bachman. *World Oil*, v. 132, Jan. 1951, p. 104, 106, 108, 110, 112, 114, 116.

See abstract of "Drill Pipes and Tool Joints Undergo Rigid Tests for Fatigue," *Drilling*, item 11-R, 1951. (R1, Q7, AY)

29-R. Corrosion Control in Waterflooding. Frederick Latter. *World Oil*, v. 132, Jan. 1951, p. 141-142, 144.

Treatment of water with corrosion inhibitors in the Bradford, Pa., field. (R10)

30-R. Influence of the Quality of Mortar and Concrete Upon Corrosion of Reinforcement. Rachel Friedland. *Journal of the American Concrete Institute*, v. 22, Oct. 1950; *Proceedings of the American Concrete Institute*, v. 47, 1950, p. 125-139.

The variables studied were cement content, water-cement ratio, consistency, grading, and depth of cover. The specimens, stored in moist air or exposed to weather, were tested up to 2 years. Results indicate that there appears to exist an "optimum consistency" at which the quantity of rust is practically unaffected by time. The usual cement contents in reinforced concrete have only a limited corrosion effect. (R6, T26, ST)

31-R. Rate of Dissolution of Silver in Aqueous Ceric Sulfate Solutions. Hugh W. Salzberg, Helen Knoetgen, and Ann M. Molless. *Journal of the Electrochemical Society*, v. 98, Jan. 1951, p. 31-35.

Results of experimental and theoretical study. Dissolution of Ag and Cu in ceric sulfate is diffusion controlled, in contrast to dissolution in ferric sulfate solutions, which is desorption controlled. By analogy with silver, reactions between oxidants and metals with small differences in standard oxidation potential should be desorption controlled and those with large potential differences should be diffusion controlled. (R5, Ag)

32-R. Some Historical Developments Relating to Corrosion. Wilson Lynes. *Journal of the Electrochemical Society*, v. 98, Jan. 1951, p. 3c-10c.

Chronological arrangement of some developments relating to corrosion, in which references are given to papers and patents considered to be among the significant contributions to advancement of understanding of its nature, or control of its manifestations. Excerpts from a few of the earlier papers. Early developments in the electrochemical concept of corrosion are summarized. (R general)

33-R. How Morton Salt Refines Salt, Fights Corrosion, Handles Solids. James A. Lee. *Chemical Engineering*, v. 58, Jan. 1951, p. 102-105.

Details of equipment layout, materials handling, and materials of construction for corrosion resistance. Includes flow diagrams. Among the alloys used are monel, Type 316 stainless steel, and Ni-Resist. (R6, Ni, SS)

34-R. Corrosion Resistance of Copper and Copper Alloys. Part I. Resistance to Common Corrosives. Part II. Corrosion Rating Chart. Part III. Composition Table. *Chemical Engineering*, v. 58, Jan. 1951, p. 108-112.

Comprehensive tabular data. Includes list of some typical industrial uses. (R5, T29, Cu)

35-R. Construction Materials in the Paper Industry. Part IV. Alkaline Pulping. *Chemical Engineering*, v. 58, Jan. 1951, p. 217-218, 220-221, 222, 224, 225-226.

Short articles on the applicability and corrosion resistance of specific materials for process equipment used in alkaline pulping: "Worthite", W. E. Pratt; "Carbon", L. C. Werking; "Cements", Raymond B. Seymour; "Durimet 20", Walter A. Luce; "High-Silicon Irons", Walter A. Luce; "Chlorimets", Walter A. Luce; "Iron and Steel", Arthur E. May and Albert W. Spitz; "Rubber", James P. McNamee; "Nickel. Nickel Alloys", H. O. Teeple. (R5, T29)

36-R. New Flash Tower Resists High Sulfur Corrosion. L. W. Williams. *Petroleum Refiner*, v. 30, Jan. 1951, p. 144.

Use of stainless-clad steel (Type 405) for flash tower. (R7, T29, SS)

37-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 43, Jan. 1951, p. 69A-70A, 72A.

Shows that properly treated Ti-stabilized 18-8S stainless steel is

equivalent to Cb-stabilized material for most practical purposes. Test results with boiling 65% HNO_3. (R10, SS)

38-R. Electrolytic Corrosion and the General Theory of Corrosion. *Gas Times*, v. 65, Dec. 15, 1950, p. 430-432, 437.

General discussion of 2nd Report of the Gasworks Safety Rules Committee, by E. G. Stewart and A. G. Palmer. (R1)

39-R. The Role of Diffusion in Surface Oxidation of Metals. (In French.) J. Bénard. *Métaux & Corrosion*, v. 25, Oct. 1950, p. 241-247.

Investigated for various metals whose density is greater than that of their respective oxides. Kinetics of metal oxidation, mechanism of diffusion in the oxide film, microscopic structure of the oxide film, and influence of the metal-oxide interface on rate of diffusion. 10 ref. (R2, N1)

40-R. Passivation of Stainless Steels in Certain Strong Acids. (In French.) J. M. Defranoux. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 231, Oct. 30, 1950, p. 901-903.

Investigated for steels using dilute H_2SO_4 plus 1-2% HNO_3. Influence of surface condition on passivation as a function of temperature and time. (R10, SS)

41-R. (Pamphlet) **2nd Report of the Gas Works Safety Rules Committee. Electrolytic Corrosion and the General Theory of Corrosion.** E. G. Stewart, A. G. Palmer, W. T. K. Braunholtz. *Institution of Gas Engineers*, Copyright Publication No. 374, Nov. 1950, 43 pages.

Types of electrolytic corrosion and test procedures. Interprets results. Practical mitigation of corrosion. Covers cast iron, and carbon and alloy-steel pipe. 64 ref. (R1, CI, CN, AY)

S

INSPECTION AND CONTROL

1-S. Determination of Traces of Silicon in Vanadium and Uranium; Spectrophotometric Method. Ruth Guenther and Richard H. Gale. *Analytical Chemistry*, v. 22, Dec. 1950, p. 1510-1511.

Previously abstracted under similar title from *U. S. Atomic Energy Commission*, AECD-2792, Nov. 8, 1949. See item 154-S, 1950. (S11, V, U)

2-S. Spectrophotometric Determination of Beryllium in Aluminum with Sulfosalicylic Acid. H. V. Meek and Charles V. Banks. *Analytical Chemistry*, v. 22, Dec. 1950, p. 1512-1516.

Procedure is designed for the range of 0.0015-0.23% Be, but may be conveniently changed to accommodate much higher or lower ranges. (S11, Al, Be)

3-S. Colorimetric Determination of Copper in Steel with Rubeanic Acid. Walter L. Miller, Isidore Geld, and Max Quatinetz. *Analytical Chemistry*, v. 22, Dec. 1950, p. 1572-1573. (S11, Cu, ST)

4-S. Birthmarking Alloy Steels Would Save Time and Material. *Steel*, v. 127, Dec. 25, 1950, p. 54-56.

Universal standards for continuous ink stamping are suggested as answer to current confusion over coding. (S10, AY)

5-S. Determination of Oxygen in Zirconium Metal. E. B. Read and L. P. Zopatti. *U. S. Atomic Energy Commission*, AECD-2798, Feb. 14, 1950, 7 pages.

A vacuum-fusion technique. The procedure makes use of the fact that Zr and most of the metallic impurities may be volatilized as chlorides upon treatment with dry HCl gas at a temperature as low as 450° C. Includes diagram of apparatus. (S11, Zr)

6-S. Metallurgical Trends in Production of Steel Plates. W. Barr. *Engineering*, v. 170, Dec. 1, 1950, p. 453. (A condensation.)

An address. Trends in compositions, test methods, specifications, and applications. (S22, Q general, ST)

7-S. Influence of Character of Surfaces on Condensation of Molecular Jets of Antimony. (In French.) Gustave Ribaud and Marcel Devienne. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 231, Oct. 16, 1950, p. 740-742.

Compares two different techniques, both utilizing jets of radioactive Sb. In one, the density of the deposit is evaluated by use of a Geiger counter. In the other an autoradiographic technique is used, in which the metal is deposited across the division line between plates of two different metals. If there is any essential difference in the receptivity of the two metals for the deposit, this fact is visually apparent. Results for Cu and Al, also for deposition on glass. (S19, L17, Sb, Cu, Al)

8-S. Remarks Concerning the Planochromometric Method of Glazunov and Jirovsky for Rapid Determination of Sulfur in Steel. (In Czech.) Jan Korecky and Josef Nejedly. *Hutnické Listy*, v. 5, Sept. 1950, p. 359-362.

Above method (reported in 1948) was investigated. Several disadvantages were found to exist. Comparison with the combustion method shows that, contrary to Glazunov and Jirovsky's paper, the latter is more rapid. (S11, ST)

9-S. Open Hearth Bath Pyrometers. H. B. Emerick. *Blast Furnace and Steel Plant*, v. 38, Dec. 1950, p. 1425-1427.

Various types. (S16, D2, ST)

10-S. Titanium and Its Alloys. Walter C. McCrone and Julian Glasser. *Frontier*, v. 13, Dec. 1950, p. 12-15.

Present analytical methods and need for improvements and new methods in production control, specifications, fundamental research, and applied research. (S11, S12, S22, Ti)

11-S. Statistical Quality Control. Harry A. Schwartz. *Foundry*, v. 79, Jan. 1951, p. 94-95, 223-224.

Application to production of malleable iron and steel castings at the five plants of National Malleable and Steel Castings Co. (S12, E general, CI)

12-S. The Use of Radioactive Isotopes in Industrial Radiography. Gerold H. Tenney. *Non-Destructive Testing*, v. 9, Fall 1950, p. 6-8.

Literature is reviewed. The production of isotopes and selection of the best type of isotope from the standpoint of industrial radiography. 13 ref. (S19)

13-S. Inspection of Crane Hooks by the Magnetic Particle Method. Martin B. Graham. *Non-Destructive Testing*, v. 9, Fall 1950, p. 9-10.

Procedure. Micrographs show effect of annealing on microstructure of cold-worked crane hooks. (S13, CN)

14-S. Radiologic Safety in Radiography With Isotopes. Thomas N. White. *Non-Destructive Testing*, v. 9, Fall 1950, p. 19-22.

Safety problems encountered in use of radium and radioactive isotopes in radiography. Special attention is given to some problems that might not be apparent from reading the literature, or which are thought deserving of particular emphasis. An appendix includes more detailed information and a selected bibliography. 20 ref. (S19, A7)

15-S. For Successful Production Welding Know Your Metals. Jay Bland. *Industry & Welding*, v. 24, Jan. 1951, p. 30, 32-33.

Simple methods of identification of metals: magnet and spot tests; chisel tests; and hardness tests. (S10)

16-S. Direct-Reading Spectrometer Speeds Steel Production. Earl R. Vance. *Western Machinery and Steel World*, v. 41, Dec. 1950, p. 46-47.

Use by Timken Roller Bearing Co. for analysis of preliminary and ladle tests from the melt shop. (S11, St)

17-S. Importance of Surface Finish as Applied to Gage Blocks. H. J. Chamberland. *Western Machinery and Steel World*, v. 41, Dec. 1950, p. 64-66.

Surface finish standards. Methods of surface finishing gage blocks. Inspection procedures. (S15)

18-S. Aluminium in Aluminium-Bronze; Some Observations on the Rate of Mercury Cathode Electrolysis. E. C. Mills and S. E. Hermon. *Metal Industry*, v. 77, Dec. 15, 1950, p. 275-276.

Experiments on rate of removal, under specific conditions, of unwanted elements from Al bronze by mercury-cathode electrolysis prior to determination of aluminum in certain Al bronzes. (S11, Cu, Al)

19-S. Some Considerations Concerning Determination of the Weight of Silver on the Active Faces of Mirrors. (In French). A. Scaut. *Verres et Réfractaires*, v. 4, Oct. 1950, p. 287-292.

Describes a new potentiometric method for the above, also for determination of thickness of the silver deposit. The method also detects irregularities of the deposit. Theoretical bases of the method and data. (S15, Ag)

20-S. Measuring the Temperature of Hardening. (In German.) Walter Zschaage. *Archiv für technisches Messen*, Nov. 1950, p. T121-T122 (4 p.)

Various methods and equipment for measuring heat treating temperatures. 25 ref. (S16, J general)

21-S. Researches on the Surface-Technology in Japan. (In English.) Makoto Okoshi. *Japan Science Review*, ser. 1, v. 1, Mar. 1949, p. 101-109.

Abstracts of various research papers published in Japan; also a general summary. Fields covered are abrasion, lubrication, characteristics of finished metallic surfaces, and apparatus for determination of surface roughness. (S15)

22-S. Research on Measurement of the Temperature of Molten Steel. (In English.) Kiyoshi Sasagawa, Hidetsugu Hotta, and Tadaichi Omuro. *Japan Science Review*, ser. 1, v. 1, Mar. 1949, p. 179-189.

Details of a W-Mo thermocouple and protective shield. The part immersed in molten steel is covered by a carbon tube coated with SiC by a sintering process. Temperature distributions in the atmosphere and in the melt of openhearth and electric steel furnaces under various conditions were determined. (S16, D2, D5, ST, W, Mo, SG-a)

23-S. Study on Surface of Casting. (In English.) Kazuo Katori. *Journal of Mechanical Laboratory*, v. 4, Mar. 1950 (Special No.), p. 32-36.

Effects of various factors on the smoothness or roughness of surfaces of sand castings. Both mold and casting surfaces were studied using optical and feeler methods. (S15, E11)

24-S. Examination of the Tracer Method With the Electron Microscope. (In Japanese.) Atsushi Inoue and Riitsu Takagi. *Journal of Mechanical Laboratory,* v. 4, Mar. 1950, p. 47-49.

Surface-roughness measurement with pointed feelers. Accuracy of the method was studied by means of the electron microscope. Micrographs illustrate results obtained for brass surfaces. (S15, M21, Cu)

25-S. Radioactive Tracers Detect Soil on Cleaned Surfaces. *Steel,* v. 128, Jan. 15, 1951, p. 102-104. (Based on paper by J. C. Harris, R. E. Kamp, and W. H. Yanko.

Previously abstracted from *Journal of the Electrochemical Society,* under similar title. See item 492-S, 1950. (S15, S19, L12)

26-S. Measuring the Thickness of Thin Coatings With Radiation Backscattering. Eric Clarke, J. R. Carlin, and W. E. Barbour, Jr. *Electrical Engineering,* v. 70, Jan. 1951, p. 35-37.

Nondestructive process which can be used in production wherever measurement is to be made of coating which has a different atomic number from the backing material. (S14)

27-S. Rapid Analysis Cuts Furnace Holding Time. L. Silverman, H. E. Schwartz, and B. Chalett. *Iron Age,* v. 167, Jan. 18, 1951, p. 70-72.

How rapid control analysis of furnace heats with the photometer reduces the length of time the heat must be maintained at high temperature. A new procedure was developed for colorimetric control of the base metal and important constituents of Mn bronze. (S11, Cu)

28-S. Economy Through Better Control of Reinforcing Steel. F. Tessitor and P. Rosewarne. *Journal of the American Concrete Institute,* v. 22, Dec. 1950; *Proceedings of the American Concrete Institute,* v. 47, 1950, p. 333-340.

Difficulties encountered through use of reinforcement steels not in strict accordance with present-day specifications. Simplification of materials requirements, liberalization of code requirements to permit hot bending of bars, and permanent identification of grade of steel would, in large measure, permit designers to apply reinforcement to structures in a more effective manner. (S22, T26, ST)

29-S. An Improved Vacuum Fusion Furnace. W. G. Guldner. *Bell Laboratories Record,* v. 29, Jan. 1951, p. 18-20.

Furnace, developed for use in determining the gas content of metals. (S11)

30-S. Rotary Printer Speeds Sheet and Strip Stenciling. Carl A. Banze. *Steel,* v. 128, Jan. 22, 1951, p. 92, 94.

Imprinting identification data on surface of steel while in transit through rolls is now accomplished automatically by a revolving cylinder. Rubber type is held securely in the die while in service on a high-speed temper mill. (S10)

31-S. Practical Toolmaking. Part I. J. Y. Riedel. *Modern Machine Shop,* v. 23, Jan. 1951, p. 104-108, 110-111, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140.

The basic causes of tool failures, both before and after the tools are put in service. Includes design, fabrication, and metallurgical factors. Heat treatment procedures. (S21, J26, TS)

32-S. Flaw Detection With Supersonic Waves. R. Brown. *Canadian Metals,* v. 13, Dec. 1950, p. 24-25, 29.

Use of the Hughes Supersonic Flaw Detector (British-made). (S13)

33-S. Applications of the Electronic Tubes to the Measurements of Temperature. Jean Schwartz. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 247-253. (Translated from the French.)

"Bail type" regulators and compensating devices. Begins section on electronic amplifiers and their applications. Diagrams show temperature-time diagrams of furnaces under different types of control. (To be continued.) (S16)

34-S. Gamma Ray Metallography. Jean Ternisien. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 269-275. (Translated from the French.)

First installment. Introduction and sections on radioactive elements; discovery of radioactivity; coefficients of the law of transformation; radioactive equilibrium; the family of radioelements; and atomic numbers of radioactive isotopes. (To be continued.) (S19, M23)

35-S. Methods of Measurement and Definition of Surfaces (Continued). H. Becker, Wetzlar. *Microtechnic,* (English Edition.) v. 4, Sept.-Oct. 1950, p. 276-282. (Translated from the German.)

Concludes section on optical methods. Largely devoted to "feeler" or profilometer methods and equipment. (To be continued.) (S15)

36-S. Presidential Address. S. F. Dorey. *Institution of Mechanical Engineers Proceedings,* v. 162, No. 3, 1950, p. 368-377.

Experiences in the fields of boilers and pressure vessels (design, materials selection, caustic cracking, corrosion, and welding); marine-engine shafting (elastic hysteresis, corrosion fatigue, torsional vibration, and other causes of service failures); marine-reduction gearing (design and machining); hull vibration and engine balance; and strain measurement. 15 ref. (S21, R1, Q9, ST)

37-S. (Book) **Symposium on Application of Statistics.** *American Society for Testing Materials,* 1916 Race St., Philadelphia 3, Pa. Special Technical Publication No. 103, 1949, 36 pages. $1.00.

Consists of "Introduction," by C. M. Wakeman, plus the following papers: "The Economic Relationship Between Design and Acceptance Specifications", Eugene L. Grant; "Precision and Accuracy of Test Methods," Grant Wernimont; "Use of Statistics to Determine Precision of Test Methods", W. J. Youden and J. M. Cameron; and "Modern Quality Control" (introduction to a motion picture), Simon Collier. Includes discussions. (S12)

38-S. (Book) **Colorimetric Determination of Traces of Metals. Ed. 2.** E. B. Sandell. 673 pages. 1950. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. $9.

Methods of separation and isolation of substances, colorimetry and spectrophotometry in trace analysis, and general colorimetric reagents. Procedures for 45 elements and rare earths. (S11)

39-S. (Book) **Metals and Alloys.** 214 pages. 1950. Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, New York. $5.00.

See abstract of "Metals and Alloys. Ed. 5," published by Iliffe and Sons, Ltd., London, England. (Item 12-183, 1949). (S22)

T

APPLICATIONS OF METALS IN EQUIPMENT

1-T. The Development of a Hollow Blade for Exhaust Gas Turbines. H. Kohlmann. *National Advisory Committee for Aeronautics.* Technical Memorandum 1289, Dec. 1950, 51 pages. Translated from *Zentrale für wissenschaftliches Berichtswesen der Luftfahrtforschung des Generalluftzeugmeisters* (Berlin-Adlershof, Germany), Untersuchungen und Mitteilungen No. 788, Dec. 1943.

Development of blade profiles, calculation of temperature distribution and stresses in the blade shank, development of manufacturing methods, attachment of blades in the rotor, forms of blades with box root, and their mounting in the rotor. (T25, Q25)

2-T. Increasing Drop Forging Die Life. Part I. John Mueller. *Steel Processing,* v. 36, Dec. 1950, p. 616-618.

Recommendations for design, heat treatment, stress relief and selection of die material. (T5, F22, J general, TS)

3-T. Stainless Steel Research Leads Way to Larger TV Screen. *Steel Processing,* v. 36, Dec. 1950, p. 621, 645.

Development of 17% Cr steel having a coefficient of expansion parallel to that of glass, for use in TV tubes. (T1, P11, SS)

4-T. Multiply Spring Life Without Changing Design. Clyde W. Oicles and Fred K. Landecker. *Iron Age,* v. 166, Dec. 21, 1950, p. 80-82.

How 11 times more fatigue resistance was imparted to the springs in the Web Wilson oil well drill-pipe tongs. To do it, a change from SAE 1095 to SAE 6150 steel, a change in heat treating methods, and adoption of stress peening was required. (T7, J general, G23, AY)

5-T. Construction Materials in the Paper Industry. Part III. Acid Pulping. *Chemical Engineering,* v. 57, Dec. 1950, p. 223-224, 226, 228, 230, 232, 234, 236.

Consists of the following brief articles: "Worthite", by W. E. Pratt; "Lead", by Kempton H. Roll; "Cements", by Raymond B. Seymour; "Rubber", by James P. McNamee; "Iron and Steel", by Albert W. Spitz and Arthur E. May; "High-Silicon Irons", by Walter A. Luce; "Nickel, Nickel Alloys", by H. O. Teeple; "Chlorimets", by Walter A. Luce; "Stoneware", by M. J. Winson; and "Durimet 20", by Walter A. Luce. (T29, R5)

6-T. Wraps Taken Off Low-Power Nuclear Reactors. *Steel,* v. 127, Dec. 25, 1950, p. 57-60.

Uranium-graphite, uranium-heavy water, and homogeneous types of energy piles. Large quantities of aluminum, cadmium, lead, graphite, and concrete are required. (T5, T29, Al, Cd, Pb, C)

7-T. How Copper-Base Casting Alloys Are Used in Electrical Industry. R. A. Colton. *Materials & Methods,* v. 32 Dec. 1950, p. 57-61.

Manufacturing cost of electrical equipment can be frequently cut by proper selection of materials, based on conductivity, strength, corrosion resistance, machinability, and castability. Physical (electrical conductivity) and mechanical properties are tabulated and charted. (T1, P15, Q general, Cu)

8-T. Welding Electrodes and Rods for Ferrous and Nonferrous Metals. H. R. Clauser. *Materials & Methods,* v. 32, Dec. 1950, p. 67-82.

Manual is intended as a guide for those faced with the problem of filler-metal selection. It covers the standard type electrodes and welding rods for joining all the common ferrous and nonferrous metals and alloys, including irons and steels, Cu-base alloys, Al, Mg, Ni alloys, Zn, and Pb. (T5, K1, K2)

9-T. Recommended Carbide Grades for Various Applications. *Materials & Methods,* v. 32, Dec. 1950, p. 85.

Table correlates manufacturers' recommendations for applications of nine trade-named products.
(T6, C-n)

10-T. Metal Grit for Sand-Blasting; Advantages of Si:Mn Steel Over Quartz. *Chemical Age*, v. 63, Dec. 2, 1950, p. 777.
(T5, L10, AY)

11-T. Gresford Cages—Progress Report. *Light Metals*, Nov.-Dec. 1950, p. 522-523.

Condition of all-aluminum mine-shaft cages after 12 mos. operation. Condition was satisfactory in all respects, including wear at points of friction, paint-film durability, and corrosion resistance. (T28, Al)

12-T. The London Motor Shows. *Light Metals*, Nov.-Dec. 1950, p. 524-529.

Light-metal applications in automobiles exhibited. (T21, Al)

13-T. Aluminium-Alloy Structures—An Assessment. C. Marsh. *Metals*, Nov.-Dec. 1950, p. 530-536.

Problems and some controversial aspects concerning present and future use of light alloys in structures. (T26, Al)

14-T. Light-Alloy Castings—A Record of Post-War Achievement. *Light Metals*, Nov.-Dec. 1950, p. 537-549.

A variety of castings for general engineering and aircraft use, made by a British firm. Materials are both Al and Mg alloys.
(T24, Al, Mg)

15-T. Concerning Aluminum-Steel Trolley Wires for Street Cars and Trolley Buses. (In French.) Louis Albert. *Revue de l'Aluminium*, v. 27, Sept. 1950, p. 308-312.

Three years after installation on a trolley-bus line in the Paris suburbs, inspection of an Al-steel trolley wire showed promising results. After 400,000 bus passages, the very hard collecting shoes have caused an average wear of 0.01 in., so that the useful life of this type of contact wire should correspond to 2 million passages. Behavior of the wire was found quite satisfactory as regards corrosion, vibration, and resistance to short circuits.
(T1, Q9, R3, Al)

16-T. Self-Supporting Roofs. (In French.) Maurice Victor. *Revue de l'Aluminium*, v. 27, Sept. 1950, p. 315-321.

Several examples of roofs made of light-alloy materials. Weight is only about 2 lb. per sq. ft. and, up to 600 ft. diameter, no central supports are necessary. (T26, Al)

17-T. Antenna Pole for Radio Communication. (In French.) *Revue de l'Aluminium*, v. 27, Sept. 1950, p. 324-327.

New type of pole. (T1, Al)

18-T. Small Handling Equipment. (In French.) Henri Hugonnet. *Revue de l'Aluminium*, v. 27, Sept. 1950, p. 331-335.

Miscellaneous wheelbarrows, trucks, ladders, etc., made of light alloy. Advantages. (T5, Al)

19-T. Results From a Redesigned Continuous Heating Furnace. (In German.) Erich Faber. *Stahl und Eisen*, v. 70, Nov. 23, 1950, p. 1111-1115; disc., p. 1115.

Factors to be considered in redesigning furnace so as to produce an optimum degree of efficiency. The principles discussed apply also to other types of heating or heat treating furnaces. (T5, J general)

20-T. Steels for Die Casting and Die Forging. (In Czech.) Rudolf Stefec. *Hutnické Listy*, v. 5, June 1950 (Supplement), p. 76-79.

Development of steels for use in die casting individual metals and alloys in Czechoslovakia and elsewhere is compared. Factors causing wear of dies. Need for development of new steels or alloys for more economical casting of brass and higher melting-point metals. Defects occurring during heat treatment and their causes. (T5, E13, F22, TS)

21-T. Stainless Resistor Gives High Starting Torque. *Iron Age*, v. 166, Dec. 28, 1950, p. 74.

Application of stainless steel in a.c. induction motors used in Le Tourneau earthmoving equipment.
(T1, SS)

22-T. Aluminum Railroad Furniture: Functional, Lightweight, Attractive. *Modern Metals*, v. 6, Dec. 1950, p. 40-41.
(T10, T23, Al)

23-T. Static Magnetic Memory for Low-Cost Computers. Marshall Kincaid, John M. Alden, and Robert B. Hanna. *Electronics*, v. 24, Jan. 1951, p. 108-111.

A magnetic material having a rectangular hysteresis loop provides information storage independent of mechanisms, variable data-handling rate up to 30,000 p.p.s., and pulse storage without power. The material was developed in Germany and is now produced by Allegheny Ludlum Steel Corp. under the name "Deltamax." How it is applied.
(T8, P16, SG-n, p)

24-T. Extruded Aluminum Tubing Forms Sturdy Lightweight Scaffolding. *Western Machinery and Steel World*, v. 41, Dec. 1950, p. 52-54.
(T26, Al)

25-T. Application of Alloy Steels to High Temperature Steam Turbine Service. W. L. Heishmann. *Blast Furnace and Steel Plant*, v. 38, Dec. 1950, p. 1447-1450, 1482-1483.

Influences of temperature, heat treatment, and composition. Advantages of vanadium. Effects on mechanical properties and microstructure. 15 ref.
(T25, Q general, AY, SG-h)

26-T. Modern Materials and Their Relation to Power-Generating Equipment. George N. Moffat. *Engineering Experiment Station News* (Ohio State University), v. 22, Dec. 1950, p. 29-30, 54.

Metallurgical and ceramic problems involved in design of power-generating equipment for operation at higher and higher pressures, speeds, and operating temperatures.
(T25, SG-h)

27-T. Metal-Backed TV Picture Tubes. C. T. Waugh. *Tele-Vision Engineering*, v. 1, Dec. 1950, p. 12-14.

Mechanism of operation of metallized and nonmetallized tubes. Advantages of the former, which is produced by vapor deposition of Al on a plastic film which is first applied to the original phosphor coating. (T1, L25, Al)

28-T. Review of the Month: The Use of Lead in the Plating Room. *Plating*, v. 38, Jan. 1951, p. 39, 57.

Corrosion resistance; formability; and applications.
(T5, R5, L17, Pb)

29-T. Steel Plates; Modern Metallurgical Trends in Production. W. Barr. *Iron and Steel*, Nov. 28, 1950, p. 421-422.

Metallurgical problems in connection with production of ship plates and boiler plates. Brittle fracture of ship plate; variations in composition of large boiler plate; steels for pressure vessels.
(T22, T26, Q23, CN)

30-T. Electrical Transmission Lines Protected by Aluminum Conduits. (In French.) Maurice Victor. *Revue de l'Aluminium*, v. 27, Oct. 1950, p. 363-367.

Use in the Rogerstone plant of Northern Aluminium Co. in Great Britain. Advantages over steel conduit. (T1, Al)

31-T. Ventilation and Air-Conditioning Ducts for Synthetic-Fiber Plants. (In French.) J. Borel. *Revue de l'Aluminium*, v. 27, Oct. 1950, p. 370-371.

Describes and illustrates use of pure Al or Al alloys. Advantages with respect to resistance to corrosive external atmospheres likely to be encountered, and also with respect to light weight. (T27, Al)

32-T. New French Liner: "Liberté et Kairouan." (In French.) Pierre Vidal. *Revue de l'Aluminium*, v. 27, Oct. 1950, p. 374-376.

Emphasis on uses of Al alloys.
(T22, Al)

33-T. Metallic Hatch Covers of the Light Alloy A-G5 for Rapid Handling. (In French.) *Revue de l'Aluminium*, v. 27, Oct. 1950, p. 377-378.

Hatch covers installed on the new French liner "Liberté et Kairouan."
(T22, Al)

34-T. Greenhouses in Light Alloys. (In French.) Andre Chevrier. *Revue de l'Aluminium*, v. 27, Oct. 1950, p. 379-381.

Greenhouse with an Al alloy framework, also a cowbarn with a sheet Al roof. (T26, Al)

35-T. Concerning the Research of A. A. Baikov on the Metallurgy of Materials Used in the Transportation Field. (In Russian.) N. P. Shchapov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1950, p. 1513-1521.

Reviews important contributions of Baikov to heavy industry in the U.S.S.R. through his research in the metallurgy of materials used in transportation, particularly railroads. (T23)

36-T. Roofing Tile Made of Steel Powder Cement. (In English.) Minoru Hamada. *Japan Science Review*, ser. 1, v. 1, Mar. 1949, p. 210-212.

Steel-powder cement is a new cement suitable for making roofing tiles and for wall plaster, etc. Reason for hardening, effect of method of manufacture on properties of the cement, properties of the mortar, method of making steel-cement tiles and their properties. (T26, ST)

37-T. Investigation of Coal-Pick Steel From the Metallurgical Point of View. (In Japanese.) Tetsutaro Mitsuhashi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory*, v. 4, July 1950, p. 143-146.

Several carbon steels made by different Japanese firms were investigated. Recommendations for composition and heat treatment. Alloy steels are recommended for stock more than 25 mm. in diam.
(T28, CN)

38-T. Patton Tanks Roll From Detroit Arsenal. Charles H. Wick. *Machinery* (American), v. 57, Jan. 1951, p. 136-145.

How 47-ton Patton tanks are being produced from lighter and slower Pershing tanks; and how M-24 tanks are being overhauled at Detroit Arsenal. Operations include machining, flame cutting, hard surfacing, and welding.
(T2, G17, G22, K general, L24, ST)

39-T. Two New Gear Materials. *Machinery* (American), v. 57, Jan. 1951, p. 181-188. Condensed from paper by C. M. Schwitter.

Second of two articles. The mechanical properties of ductile iron, and how this material can be used in manufacturing of heavy-duty gears. (T7, Q general, CI)

40-T. Two New Gear Materials. C. M. Schwitter. *Automotive Industries*, v. 104, Jan. 1, 1951, p. 42-45, 82, 84, 86, 88.

See abstracts of condensed version from *Machinery* (American),

items 528-T, 1950, and 39-T, 1951. (T7, Q general, AY, CI)

41-T. Aluminum Exterior Facing for Lightweight Fire-Rated Wall Construction. O. M. Mader. *Corrosion* (News Section), v. 7, Jan. 1951, p. 1.

Illustrates 2 buildings on which the above was used. (T26, Al)

42-T. Two Steels Make Our Plastic Molds. R. W. Brown. *American Machinist,* v. 95, Jan. 8, 1951, p. 112-113.

Tests at Westinghouse which cut mold-steel types to two for all requirements. Molds are improved, heat treating problems simplified, and cost reduced. For machined cavities, SAE 3335 plus 0.25% Mo is used. For hubbed cavities, a nominal composition of 0.07% max. C, 0.20-0.40% Mn, 0.40-0.60% Mo, and 4.5-5.0% Cr was selected. Work-hardening characteristics are charted. (T5, Q AY, TS)

43-T. Packaging Notebook. VIII. Returnable Metal Drums. R. W. Lahey. *Chemical Engineering,* v. 58, Jan. 1951, p. 210, 212-214.

Materials of construction, design, and fabrication procedures. Al, stainless steel, Ni, and Mg are sometimes used, as well as carbon steel. (T5, G general, CN, SS, Al, Ni, Mg)

44-T. New Defense Roles for Special Steels. *Steel Horizons,* v. 13, Winter 1950-51, p. 3-5, 26.

An illustrated survey. (T2, AY)

45-T. Hollywood Has a Stainless Heart. *Steel Horizons,* v. 13, Winter 1950-51, p. 6-7.

Varied uses of stainless steel in the motion-picture industry. (T9, SS)

46-T. Stainless Steel in the Orange Juice Bonanza. *Steel Horizons,* v. 13, Winter 1950-51, p. 16-18.

Uses of stainless steel in orange-juice plants. (T29, SS)

47-T. Steel Hands for Shaping Tough Plastics. *Steel Horizons,* v. 13, Winter 1950-51, p. 20-21.

Use of die steels in molding of plastics. (T5, TS)

48-T. Reducing the Cost of Permanent Tooling. Frank Charity. *Modern Machine Shop,* v. 23, Jan. 1951, p. 202-204, 206, 208, 210, 212, 214, 216, 218.

Techniques for obtaining permanent production molds and dies at costs which are comparable to those of temporary tooling. The method consists, briefly, of producing a metallic cavity or shell on a low-melt thermoplastic pattern and separating the shell from its pattern so that the metallic impression can be reinforced for production usage. (T5, G16)

49-T. Die Cast Brass for Simpler Tooling. *Die Castings,* v. 9, Jan. 1951, p. 21, 54.

Use for heavy-duty electric motor brush holders. (T1, Cu)

50-T. Holes and Bosses Reduce Assembly Time. *Die Castings,* v. 9, Jan. 1951, p. 22-23, 58-61.

Use of Zn-alloy die castings in time-and-date stamping mechanisms. (T8, Zn)

51-T. Die Cast Mountings Protect Delicate Shipments. *Die Castings,* v. 9, Jan. 1951, p. 24-26.

Mountings made by Lord Mfg. Co., Erie, Pa., involve a permanent bond of natural or synthetic rubber to die-cast Al-alloy members. (T5, Al)

52-T. Gas Burner Caps. D. D. Burnside. *Die Castings,* v. 9, Jan. 1951, p. 28-30, 36.

Die-cast Al burner caps for domestic gas ranges. Advantages. (T10, Al)

53-T. A Review of Some Military Uses for Die Castings. *Die Castings,* v. 9, Jan. 1951, p. 32-34.

Covers Zn, Al, and Mg. (T2, Mg, Al, Zn)

54-T. Pipe Conveyor Wins Battle Against Abrasion. *Heating, Piping & Air Conditioning,* v. 23, Jan. 1951, p. 123.

Standard pipe and fittings wore out rapidly when subjected to action of sand, silica, and other glass-furnace charges at high velocities. Adoption of Ni-Cr white iron gave excellent results. (T27, CI)

55-T. Modern Metallurgical Trends in the Production of Steel Plates. W. Barr. *British Steelmaker,* v. 16, Dec. 1950, p. 636-642.

Previously abstracted from *Iron and Steel.* See item 29-T, 1951. (T22, T26, Q23, CN)

56-T. The O.P.E.C. Home. (In French.) Maurice Victor and Jean Blanchot. *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 405-413.

French prefabricated house utilizing a maximum amount of Al alloys both inside and outside. (T26, Al)

57-T. Submarine Transmission of Three-Phase Current. The Third Conductor. (In French.) *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 414-415.

Canadian system by which electric power is sent across a 3-mile channel as 12,000-volt, 3-phase current through two single-phase cables. Cable armor is Al wire, which serves as the third conductor. (T1, Al)

58-T. The Banana Box—A Folding Container for Transportation of Bananas. (In French.) *Revue de l'Aluminium,* v. 27, Nov. 1950, p. 425.

Large Al-alloy box with capacity of 134.2 cu. ft. (T29, Al)

59-T. New Self-Lubricating Materials for Machine Construction. (In German.) H. Winkelmann. *Metall,* v. 4, Dec. 1950, p. 504-505.

Production and characteristics of a sintered bearing metal (Devametall) whose excellent self-lubricating properties are based on the fact that its metallic ingredients and a large percentage of colloidal graphite were mixed by diffusion. Composition of Devametall is not given. (T7, SG-c)

60-T. Characteristics Indices for the Adherence of Pasty Masses to Solids. (In German.) Hans Bahlsen. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Dec. 11, 1950, p. 989-993.

Primary object of the study was to find suitable solid vs. pasty mass (foods) combinations in which adhesiveness is eliminated or at least reduced to a minimum in order to reduce the tendency of foods to stick to materials of construction of food-processing machinery. Properties that cause adhesiveness and methods for measuring these properties were investigated. Results are compared with practical experience. 10 ref. (T29)

V

MATERIALS
General Coverage of Specific Materials

1-V. German Steels. *Metal Progress,* v. 58, Dec. 1950, p. 906, 908, 910, 912. Condensed from "The Ferrous Metal Industry in Germany During the Period 1939-1945", George Patchin and Ernest Brewin. (BIOS Over-All Report No. 15.)

Original previously abstracted. See item 92-V, 1950. (Fe, ST)

2-V. Cast Al-Cu-Si Alloys. *Metal Progress,* v. 58, Dec. 1950, p. 922, 924. Translated and condensed from "Aluminum Foundry Alloys Based on the Al-Cu-Si Ternary System", Franz Bollenrath and Hanns Grober.

Previously abstracted from *Metallforschung.* See item 4d-51, 1948. (Al)

3-V. Copper-Bearing, High-Strength Wrought Aluminum Alloys; Typical Properties. *Materials & Methods,* v. 32, Dec. 1950, p. 83.

Table covers compositions, physical, mechanical, and fabricating properties, corrosion resistance, available forms, and typical uses for 11S, 14S, 17S, R317, and 24S. (Al)

4-V. Two New Titanium Alloys Announced. *Iron Age,* v. 166, Dec. 28, 1950, p. 74.

Pilot-plant quantities of two new alloys are available from P. R. Mallory, Inc., Indianapolis, in the form of ingots, forged rod, and bar and drop forgings. Both combine good corrosion resistance and useful high strength properties with a high strength-weight ratio. Comparative physical and mechanical properties are tabulated. (Q general, P general, Ti)

5-V. Titanium—How It Fits in Your Tomorrow. A. H. Allen. *Steel,* v. 128, Jan. 8, 1951, p. 54-58, 79-80, 82.

Present status and future prospects, from economic and technological viewpoints. (Ti)

6-V. Developments in the Antimony Industry; A Review of Published Work, 1945-1950. W. Wendt. *Metal Industry,* v. 77, Dec. 15, 1950, p. 276-278. 38 references. (Sb)

7-V. Uses Broaden For Cast Monel. N. S. Mott. *Iron Age,* v. 167, Jan. 11, 1951, p. 63-67.

Corrosion resistance, physical and mechanical properties, microstructure, weldability, machinability, and applications. Includes table of corrosion resistances vs. a long series of common chemicals and industrial products. (T general, R general, Ni)

8-V. Cobalt. John V. Beall. *Mining Engineering,* v. 190, Jan. 1951, p. 17-24; *Journal of Metals,* v. 191, Jan. 1951, p. 17-24.

Sources, production, and uses of cobalt, not only as a metal or alloying element, but as an ingredient in chemical compounds used in ceramics, glass, paint, and many other industries. Impact of NPA's order for 70% cutback in non-military uses. Includes flowsheet showing method used by Pyrites Co. for recovery of Co from iron pyrites. Economic data are tabulated. (T general, B14, A4, Co)

9-V. Arc-Cast Molybdenum Probed for High-Temperature Utility. J. L. Ham. *Steel,* v. 128, Jan. 15, 1951, p. 106-108.

Properties and applications of commercial product, which is now cast in 9-in. ingots weighing 1000 lb. It is malleable above 2200° F., and reacts conventionally to annealing. Alloys complicate fabrication problems of the cast ingots. (Mo)

10-V. Less Familiar Metals of Commercial Importance. Otto Kay and Robert A. Lubker. *Product Engineering,* v. 22, Jan. 1951, p. 106-109.

Properties and applications of Be, Zr, V, Ta, Mo, W, and Ti. Brief tabular information on Li, Na, Ca, B, Ga, In, Tl, Ge, Cb, Se, Te, and Rh. (EG-b, d, e, f)

11-V. Titanium: A New Workhorse? Clyde Williams. *Monthly Business Review,* v. 33, Dec. 1950, p. 5.

Economics of titanium production, its properties, and prospects for greatly increased utilization. (Ti)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

MECHANICAL ENGINEER: With several years experience, preferably familiar with foundry operations, to work on plant layout and production methods in New England plant. In reply give age, training, experience, salary expected. Box 2-5.

RESEARCH FELLOWSHIP: In metallurgy at Eastern university. Postgraduate work for M.S. or Ph. D. degree. Stipend $1400 per academic year single, $2100 per year married, plus tuition fee. Start Sept. 1951. Applications accepted until March 15. Selection of research problem in variety of fields including welding, induction heating, powder metallurgy, electrometallurgy and magnetic alloys. Box 2-10.

PROCESS ENGINEER: Requires a thorough knowledge of aircraft materials and processes as well as standards and specifications. Five years experience in aircraft industry working with materials, processes and standards. Part of experience should have been gained in tool engineering. Salary range $5500 to $6500. Box 2-15.

PROCESS ENGINEER: Requires thorough knowledge of aircraft materials and processes as well as standards and specifications. Five years experience in aircraft industry in working design liaison, production engineering and cost analysis. Basic function of job is to advise engineers on good design for manufacturability. Salary range $5500 to $6500. Box 2-20.

PROCESS ENGINEER: Requires good metallurgical background specializing in aircraft metals, both ferrous and nonferrous. Knowledge of aircraft processes, materials, standards, and specifications. Should have five years experience in aircraft industry. Salary range $5500 to $6500. Box 2-25.

SALES DEVELOPMENT ENGINEER: With stainless steel and alloy producer. Job consists of plant training course plus sales development engineering training. Prefer metallurgical engineering graduate but not necessary. Young or middle age preferred. Good opportunity for rapid advancement. Compensation and responsibility depend on ability of candidate selected. Box 2-30.

METALLURGIST or METALLURGICAL ENGINEER: For work in metals laboratory, testing materials, doing metallographic work and corrosion testing. Practical testing of materials for tools and machinery, with report and specification writing involved. M.S. degree in engineering or metallurgy with one year of experience in related work desired. Location, Newark, N. J. Box 2-35.

ANALYTICAL CHEMIST: For metals and lubricants using chemical and spectrographic methods. Some practical testing of lubricants in machinery service and report writing involved. B.S. degree in chemistry required. Some experience in related work desired but not necessary. Location Newark, N. J. Box 2-40.

FIELD REPRESENTATIVE: To sell heat treating chemicals, furnace equipment and accessories. Experience and knowledge of metallurgy and heat treating desirable but not absolutely necessary. Give training, experience and other information that will help evaluate qualifications. Exclusive territories open in east and midwest. Excellent opportunity. Box 2-135.

RESEARCH: Men and women wanted for studies of metallurgy of titanium and general physical metallurgy. Government laboratory in New England. Box 2-140.

RESEARCH CHEMIST or METALLURGIST: With experience in the development of processes for production of metals for work on new methods of producing titanium. Prefer men with M.S. or Ph.D. Write National Research Corp., 70 Memorial Drive, Cambridge 42, Mass., attention Stanley Heck.

RESEARCH: Recent metallurgical graduate trained in physical metallurgy for opening in research laboratory of large manufacturer of alloy, tool and stainless steels. Some training in X-ray diffraction desirable. In reply give usual details including draft status, salary expected. Box 2-145.

Midwest

METALLOGRAPHER: For research with variety of metals and alloys. Excellent opportunity for young man with degree in metallurgy wishing to make career in metallography. Some industrial or research experience desirable. Please reply directly to Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio.

CHIEF PLANT METALLURGIST: To supervise ferrous research, development and control in melting and heat treatment. Should have M.S. degree or equivalent. Box 2-45.

GRADUATE CHEMIST: For laboratory of large forge shop producing steel forgings and tools. Married man desiring to locate permanently wanted. Give complete details in first reply. Box 2-50.

QUALITY CONTROL MAN: For work in foundry and heat treat departments of large gearmotor company, to concentrate on quality improvement and scrap reduction. Desire someone with metallurgical training and actual foundry experience to work cooperatively with foundry personnel, largely on his own initiative. Box 2-55.

METALLURGIST: With experience in physical and process ferrous metallurgy to engage in contact and development work regarding alloy steels. Location, Pittsburgh. Box 2-150.

SEE ALSO BOX 2-135

POSITIONS WANTED

METALLURGIST: B.S. in chemical engineering. Experience: four years plant metallurgist in ferrous and nonferrous precision plant, of which two years was as plant manager; six years quality control work, production problems and trouble shooting in the following fields—aviation, ordnance and presses; for three years in supervisory capacity. Box 2-60.

METALLURGIST: M.I.T. Graduate, age 33, family. Eleven years experience, 5½ in government ordnance laboratory in inspection, stress analysis, report writing, research and development in hardenability, alloy steels; also experience in metallography, corrosion, stainless steels, case hardening and nonferrous metals. Desires responsible position with future in developmental research. Northeastern location preferred. Minimum salary $7500. Box 2-65.

GRADUATE METALLURGICAL ENGINEER: Twelve years experience in materials and processes and as metallurgist in aircraft manufacturing industry. Heat treatment, resistance and fusion welding, electroplating, organic finishes, copper furnace brazing, sheet metal forming, plastics, supervision of laboratory, quality control. Age 37. Box 2-70.

METALLURGIST: B.S. in metallurgical engineering. Five years experience in research and development of alloy steels. Good working knowledge of heat treatment, induction melting, physical testing, metallography and report writing. Not subject to draft. Desires position with future. Midwest or southwest area preferred. Age 30. Box 2-75.

SALES ENGINEER: Experienced older man. Broad knowledge of industries. Steel plant and engineering background, now handling heat and corrosion resistant castings in Pittsburgh. Wishes additional account in metallurgical or electrical field. Box 2-80.

METALLURGICAL ENGINEER: Over two years diversified experience. Desires position calling for experience in the application, fabrication, heat treatment and selection of materials with growing firm in metropolitan New York. Salary expected: $8500. Box 2-85.

METALLURGIST: Experienced in ferro-alloy production, smelting, refining, precious metals, ore dressing, laboratory work. Development or control. Proven ability at cost reduction and increasing production. Progressive, capable supervisor. Location immaterial. Age 33, veteran. Married, 2 children. Box 2-90.

METALLURGICAL ENGINEER: B.S. Age 31, single, veteran. Eight years experience with steel company in strip mill in both maintenance and production (expediting and supervisory capacity.) Experience in metallurgical laboratory techniques, 1½ years, including metallography and quality control. Will consider any location. Interested in production or operations work or quality control. Box 2-95.

METALLURGICAL ENGINEER: M.S. in physical metallurgy. Age 31, married, veteran. Five years experience includes nonferrous foundry, research and teaching. Desires position in industrial research or development, preferably in nonferrous field. Prefers midwest or east location. Box 2-100.

SUPERVISORY METALLURGIST: Nonferrous and ferrous experience in plant and laboratory. Mature. Able to initiate and follow through a metallurgical program. Technical writer. Interested in a job with a future in a small organization where a broad knowledge of metal properties would be an asset. East location preferred. Box 2-105.

POSITIONS WANTED

SALES ENGINEER: Over 10 years experience, both manufacturing and sales in all steel products. Now have New England sales agency for stainless steel sheets; want allied products such as bars, wire, strip, etc. Have good following. Box 2-110.

SALES ENGINEER: Want sales connection with reliable company, preferably in New England. Over 10 years experience in steel industry, both sales and manufacturing of all steel products, bars, sheet, strip, stainless, silicon, toolsteel and others. Box 2-115.

PRODUCTION MANAGER: Substantial, progressive background includes university training, manufacturing development supervision, volume metal parts fabrication and assembly, production control manager, commercial metal parts heat treating, administrator. Top ingenuity, personality, character, health. Age 48. Invite investigation by substantial medium-sized organization. Will relocate from Chicago for responsible management position. Box 2-120.

METALLURGIST: M.S. degree. Desires research or teaching position. Good background in toolmaking and die casting, some in research and development work. Presently employed. Age 30, married. Prefers northern U.S.A. or Canada. Box 2-125.

ENGINEER and METALLURGIST: Now employed. 25 years diversified experience in heavy automotive industries. Improved specifications and fabricating methods, industrial engineering, planning, production control, costs, personnel, stress analysis, design, research. Analytical approach to engineering, production, management problems. Engineering graduate. Desires vice-presidency, plant manager, director engineering, research. Box 2-130.

METALLURGIST: Ph.D. Interested in alloy steel development and research. Over ten years experience in steel mill problems. Capable of supervising research. East location preferred. Box 2-155.

SALES ENGINEER: Metallurgical graduate. Age 39. Sixteen years responsible sales and metallurgical supervisory experience in production, specifications, fabrication, machining and cost analysis of alloy, stainless and aircraft steels. Excellently qualified to produce immediate results in organization of progressive company. Box 2-160.

METALLURGIST: B.S. in metallurgical engineering. Married, age 36. Thirteen years of diversified industrial experience in metal treating field. Experienced in ordnance and aircraft work. Desires position as plant metallurgist and/or heat treating supervisor. Excellent references. No geographic preference. Box 2-165.

METALLURGICAL ENGINEER: B.S. 27 years old. Three years of industrial experience. Desires position in production or sales engineering. Box 2-170.

METALLURGIST: B.S., M.S. 30 years old. Five years research and production experience involving low, medium and stainless alloy steels including limited welding and foundry work. Inactive reserve with minor physical condition which should preclude recall. Desire position in Pittsburgh or Cleveland areas only. Approximately $5500. Box 2-175.

METALLURGICAL ENGINEER: M.S. Age 26, single, veteran. Some experience in metallography, nitriding, carburizing and heat treatment. Interested in research, product development, production or foundry problems. Will consider any position offering experience and advancement. Prefer training program. Box 2-180.

METALLURGICAL ENGINEER: Ph.D. employed last two years in A.E.C. research. Wishes to enter new employment where incentive exists. Favors research position in an aggressive company or teaching position in university. Field is in ferrous and nonferrous physical metallurgy. Wish educational minor in theoretical and applied mechanics. Favorable personality. Age 34, married. Box 2-185.

PROFESSIONAL METALLURGICAL ENGINEER: Graduate, age 30, married. Seven years at Wright Field. Broad experience in airframe, reciprocating and jet engine metallurgy, including research and development, fabrication and application; U. S. as well as foreign countries. Any location. Available immediately. Box 2-190.

Technical Papers Invited

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1952 *Transactions*. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the society. Many of the papers approved by the committee will be scheduled for presentation on the technical program of the 33rd National Metal Congress and Exposition to be held in Detroit, Oct. 15 to 19, 1951. Papers that are selected for presentation at the Convention will be preprinted and manuscripts should be received at A.S.M. headquarters office not later than April 10, 1951.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

New Members of A.S.M. Quarter-Century Club

The following A.S.M. members have been awarded honorary certificates commemorating 25 years' consecutive membership in the Society:

Akron Chapter—M. Christensen.

Boston Chapter—C. W. Babcock, Richard F. Bailey, George S. Downing, J. M. Lessells.

British Columbia Chapter—K. A. Clark.

Buffalo Chapter — Burnham E. Field.

Dayton Chapter—Earl C. Adkins, Fred Blaney, R. P. Koehring, George R. Long.

Montreal Chapter—William Baxter, F. O. Farey, Thos. C. McConkey, Garnet L. McFadyen, Wm. M. Whitehouse. **Sustaining Member:** Edgar Allen & Co. of Canada, Ltd.

WANTED

"The Book of Stainless Steels"

Urgent requests are frequently received for a copy of the A.S.M. book "The Book of Stainless Steels" (second edition), which is now completely out of print. Any owner of a copy in first-class condition who wishes to part with it for $5.00, please address: Editor, *Metals Review*, 7301 Euclid Ave., Cleveland 3, Ohio.